Specialized Oil Publications of
THE GULF PUBLISHING COMPANY

The OIL WEEKLY and The COMPOSITE CATALOG for the drilling-producing-pipeline industry

PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

☆

LOOKING AHEAD
... with the Editor

DEVELOPMENT of new tools is constantly altering methods of producing oil and gas. So vast has been the application of mechanics to production practices that one who wanted to keep up with the progress in tools has had to revise his knowledge many times.

The war has slowed down the possibilities for devising new tools because of the scarcity in materials with which to perfect them. The spirit of inventiveness is still alive however, and with the return of peace, the oil industry will benefit by countless improved items of equipment.

In an early issue of THE OIL WEEKLY a new torpedo will be presented with results of its performance covering a wide range of tests. The device uses marbles propelled by high explosives in a torpedo, to recondition wells. To date the tool has been used in more than 100 wells to clean congested porosity on the face of pay sections, to destroy liners, to ream and underream, to clean water flood and repressured wells, to knock down the shattered formation interlocked on the irregularities of shot holes, and to reopen desired parts of formation squeeze jobs within inches.

Average increase in production rates from wells where this torpedo has been used is 350 percent.

THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

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The Changing Panorama

"Pony" Edition for Men in Service

A "PONY" overseas edition of THE OIL WEEKLY for free distribution to men in the armed services abroad who formerly were engaged in the oil production-pipe line industry will begin publication September 1.

It will consist of highly briefed news items on what is happening in the industry at home, and brief resumes of the technical articles that appear from week to week in THE OIL WEEKLY.

You may have copies sent regularly to your friends or relatives in the armed services abroad simply by writing the Editor of THE OIL WEEKLY and making the request, giving the names and post office addresses of the men to whom you wish the copies sent.

This "pony" edition will be published monthly and will carry no advertising. It is intended purely as a service to the men abroad in the armed forces.

Anyone who formerly was engaged in exploration, drilling, production or pipeline work, or who formerly was connected with the equipment and supply branch is entitled to receive this "pony" edition regularly without charge. This applies to field men, foremen, superintendents, engineers, purchasing department men including warehousemen, geologists, executives, contractors and their employes—men in the Army, Navy, Seabees or the Merchant Marine.

Send in the names and addresses at once, addressing your letter to Editor, THE OIL WEEKLY, Postoffice Box 2608, Houston 1, Texas. Give the man's regular army or navy address. If the name is duplicated, the duplication will be eliminated in our offices.

Light Metals and Drilling Efficiency

WAR needs have resulted in vast expanion of facilities for making such light weight metals as magnesium and aluminum, and these metals will be seeking market outlets after the war. They will offer particular advantages where portability is a major factor.

In the oil business, for instance, more efficient drilling operations result where the degree of portability is high. Perhaps these light weight metals will be used in fabricating derricks, especially those designed for shallow-depth holes. Even here their weight might be reduced by half. If hauled on trucks constructed of light metal, the amount of equipment carried without damage to the highways would be increased substantially.

Portability of oil-well drilling equipment, one of the troublesome and costly operations of the industry, conceivably may be considerably improved following the war. In fact, use of magnesium and aluminum for such purposes may come about before the end of the war, these two metals no longer being restricted to military uses.

A Prescription For Strikers

THE other day, in Texas, an employe of one of the largest oil companies in the country, retired after 22 years of service. He was born in Moravia. In 1900 he came to Galveston, Texas. He was naturalized and became a citizen of the United States, in 1909. He then worked as a blacksmith and bricklayer until 1922 when he went to work for the oil company.

During his 22 years with the company he worked in the labor department, the paint department, at the cracking coils in the refinery, in the pipe department, the laboratory, and finally on the loading docks. He was working on the docks when he retired. He plans to spend the rest of his life on his 250-acre farm which he owns, having acquired it during the 22 years.

At a testimonial dinner given this man on his last day with the company, a sizeable purse was presented to him by his associates, along with this toast by an official of the company: "During his 22 years with this company, he established a record for devotion to duty. He never let the lack of transportation due to bad weather keep him from the job. He walked. He exemplified his belief that a man should give his company a full day's work without shirking his duty."

He might have had his chance in Moravia, but it is doubtful. He did find it in America, and through a big corporation. It is too bad that every striker in the country today, cannot have a talk with this old fellow. He might be able to help them clear their thinking.

Gas Flares Will Become Rare Sights

AN INCREASING appreciation of the value of natural gas produced in the flush southwestern fields in connection with the lifting of oil, is coming about, as the demand for gas develops. A field, even with a good gas-oil ratio, which pops off six million feet of gas daily into the air, sees the equivalent of 1000 barrels of oil per day lost to the producer. The monetary loss is not so great, but even so it will run, under such conditions, several hundred dollars per day.

When the war is over and necessary equipment can be had, it seems likely that a field which blows any considerable quantity of gas into the air will be a rare sight.

"The Order of Unselfish Service"

THE example of Rubber Director Dewey in liquidating his bureau and in turning in his resignation on the completion of his job is gratifying to those who realize the need for coordinated effort during war time, but who fear bureaucracy because of the deadening effect it has in peacetime on both national and private life.

Mr. Dewey has done a good job, thanks to his sound common sense, a well laid-out plan and the splendid cooperation he has received from the industries called upon to help solve the rubber problem.

No doubt there will be many other bureaus liquidated in the same manner. We believe that most of this liquidation will come from bureaus headed by business men who patriotically gave of their talents and time to help the country in time of war. The political bureaus, founded in considerable part to help the New Deal stay in power, and staffed by men who have had their feet in the public trough for years, will be the last to go. Some of these political bureaus no doubt will make a grab for some of the powers which will be relinquished by the genuine emergency bureaus.

The oil industry has been most fortunate in the personnel of the bureau which has directed and coordinated its

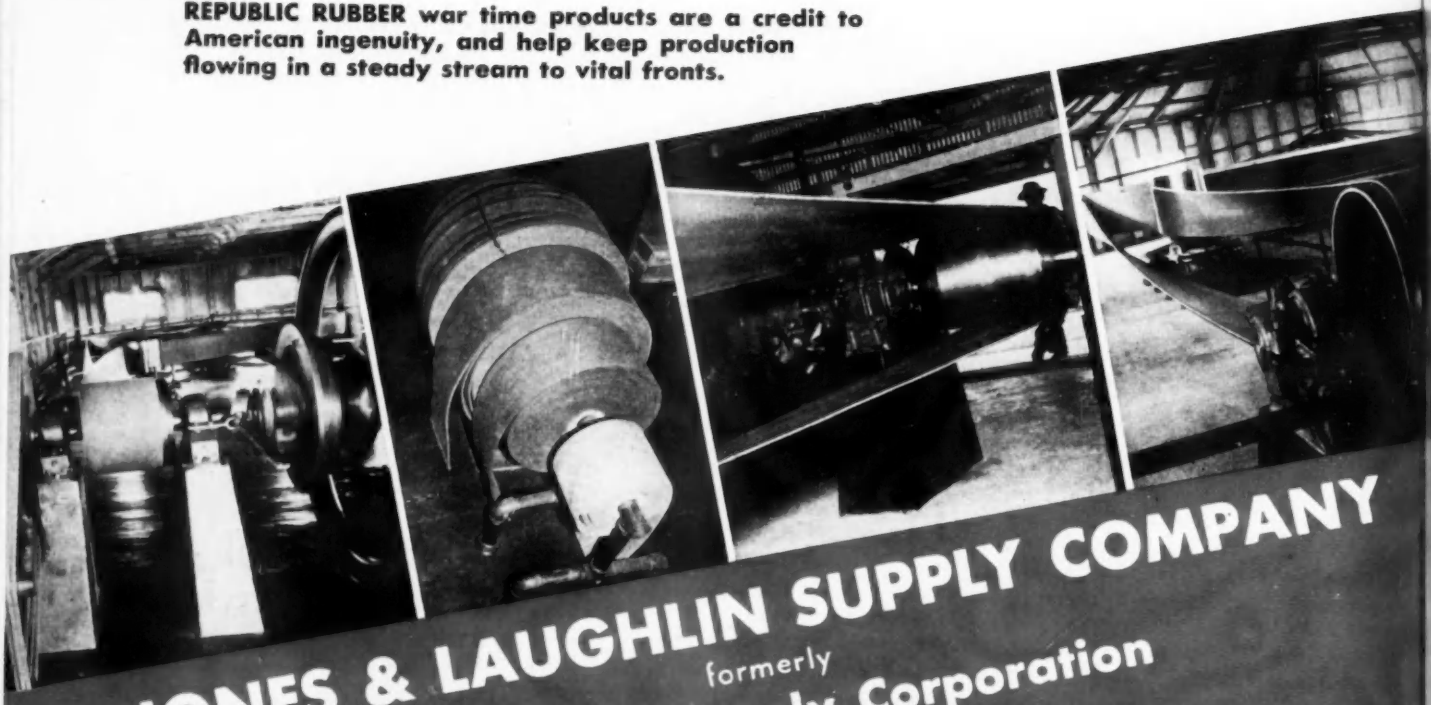
Republic belting

THE MANUFACTURER SAYS:

"War Time Regulations have made necessary changes in construction . . . for the duration."

OIL MEN SAY:

REPUBLIC RUBBER war time products are a credit to American ingenuity, and help keep production flowing in a steady stream to vital fronts.



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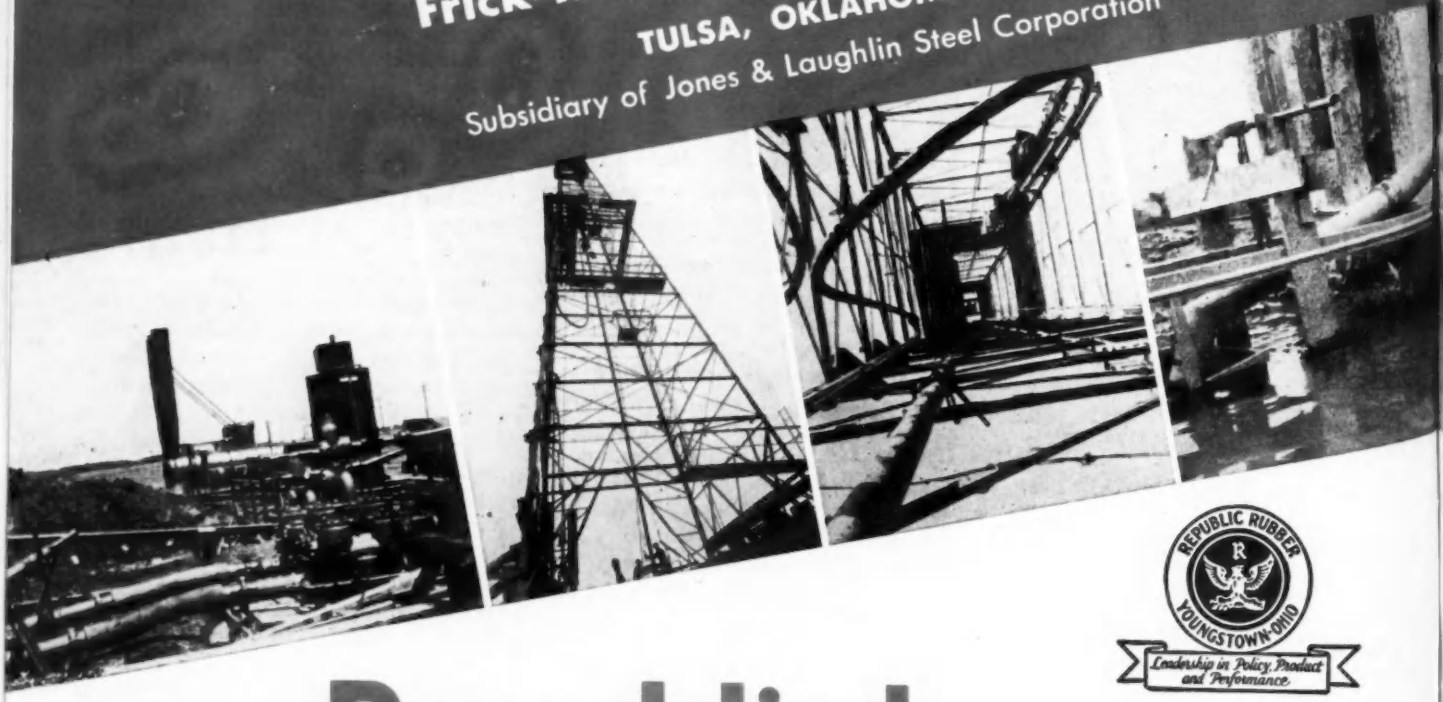

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effort—the Petroleum Administration for War. As a general rule the men attached to it have been thoroughly competent, patriotic men who transferred from private to public life without the change going to their heads. Most of these men will want to return to their private industry jobs just as soon as their work is completed. They have done a good job, and most of them realize that they hold no monopoly on brains. Occasionally one will crop up with a cry-baby attitude toward constructive criticism, but on the whole the oil industry can congratulate itself on the selection of its agency's personnel, and their performance.

We should like to suggest to the API that at its 25th anniversary meeting it take steps to create the Order of Unselfish Service to the Nation and award pins to those men who have served their country and the oil industry in PAW and PIWC.

Here is one reason why battlefield scrap is not helping to relieve the steel shortage in the United States: A 1500-ton cargo of such materials—tank treads, gun mounts and other heavy scrap—required six days to load with ship's gear and available native labor. The same scrap was unloaded at an Eastern port in 8 hours, this despite almost unbelievable consolidation of the iron during a severe storm through which the ship had passed. There just are not enough ships to keep them all but idle a week or more for the gain in scrap thus afforded.

78 Million Feet Of Hole This Year

FIGURES compiled by the Research Department of THE OIL WEEKLY indicate that this year 58,049,000 feet of hole will be drilled by the rotary method and 20,329,000 feet will be drilled by cable tools.

Consumption of all sizes of rotary drilling wire line this year is set at 5,324,000 feet while consumption of cable tool drilling wire line (of smaller average size than rotary drilling line) will approximate 7,239,000 feet. It is estimated that cable tool sand line consumption will be 712,000 feet.

These figures were arrived at through the cooperation of several oil companies and a large number of drilling contractors throughout the United States.

"What Has Happened—
"In 1942, passenger cars got 4½ gallons of gas for every gallon that went to war.
"In 1943, passenger cars got 1½ gallons for every gallon that went to war.
In 1944, passenger cars can have about ½ gallon for every gallon that goes to war."
From The Petroleum Industry's Part in the Gasoline Conservation Drive, PIWC.

Oil Discussions of Utmost Importance

THE current American-British diplomatic conference on postwar world oil supplies is of utmost significance.

The importance to the oil industry of the discussions, which are expected to lead to a compact on postwar production and distribution of petroleum, can be appreciated readily. To a very large extent, the agreement may determine the course of the petroleum industry for years to come.

However, the conference is of a much broader significance than the subject with which it deals. In the first place, it may go far toward establishing economic conditions that will promote world peace and better living conditions. With all nations oil is an absolute necessity. The problem is to give all nations, including those without rich oil resources, an opportunity to obtain the petroleum they need, and at the same time deal fairly with the less powerful nations who do posses large petroleum reserves. If the discussions successfully reach some satisfactory plan, much will have been accomplished.

The fact that discussions on oil comprise the first definite effort to deal with any postwar international trade problems makes the conference of even broader significance. The agreement on oil may set the pattern for similar arrangements with respect to other major troublesome commodities entering into world trade.

It is encouraging that to date official and unofficial comments on the oil conference have indicated that the basic principles will call for free industrial enterprise and free national competition, and that the agreement will make no provision for allocation of world markets, quotas or price maintenance, but will be strictly a compact. This would establish a medium for discussion of world oil problems, but would not affect operations of the domestic oil industry or call for a division of foreign markets between the participating nations.

Many War Planes Cannot Fly Postwar

RELIANCE on the enormous backlog of planes in the armed services as a source of civilian supply, and therefore a sizable market for high-octane gasoline, fails to take into account the characteristics of such planes which fit them admirably for wartime service, but which tend to write them off for use where operating cost, servicing and fuel consumption again become important factors.

The top-speed fighter planes, for instance are in the lingo of the pilots themselves "too hot" for ordinary flying. They require a degree of flying skill which must be kept on edge through constant practice, cannot be brought down and reflown from most of the smaller municipal airports, and require fuel and servicing all out of proportion with planes designed to meet commercial requirements.

The big bombers, designed for relatively high-speed flight, demand too much fuel to be regarded as anything more than a potential stopgap to fill the interval until manufacturers can turn out competitively effective passenger and cargo carriers.

The instances cited of fighter and bomber extend throughout the range of what might be termed first-line or fighting planes, leaving available for possible civilian demand (and ensuing civilian gasoline consumption) only the slower and relatively safer training planes for disposal. And, unless military training is dropped entirely after cessation of hostilities, training planes then in flying condition would seem to be earmarked for further service in the Air Corps, as providing equipment for the initial training for annual classes of trainees.

Analysts of possible flying needs in the first postwar years mention a production of 20,000 planes of all types in the first full peace year—or less than 25 percent of present capacity—and this, like the associated automobile production, must start from a period of no acceleration. It is probable that civilian consumption of available aircraft, like that of surplus Army trucks, alone can tend to bridge over the period during which the demand for high-octane fuel will practically cease.

How extensively the temporary cessation of demand for aviation fuel and the ensuing reduced consumption will affect the use, and through that, the search for crudes and distillates especially adapted to high-octane production will depend largely on the petro-chemical industry's ability to convert to its raw material stocks the flow of fuel now powering economically unefficient but highly satisfactory war planes.

I have supreme faith in the ability of the American people to solve satisfactorily any problem which vitally concerns the future well-being of our country.
—IRVING S. OLDS
Chairman of the board of directors, U. S. Steel Corporation.

DID YOU KNOW?

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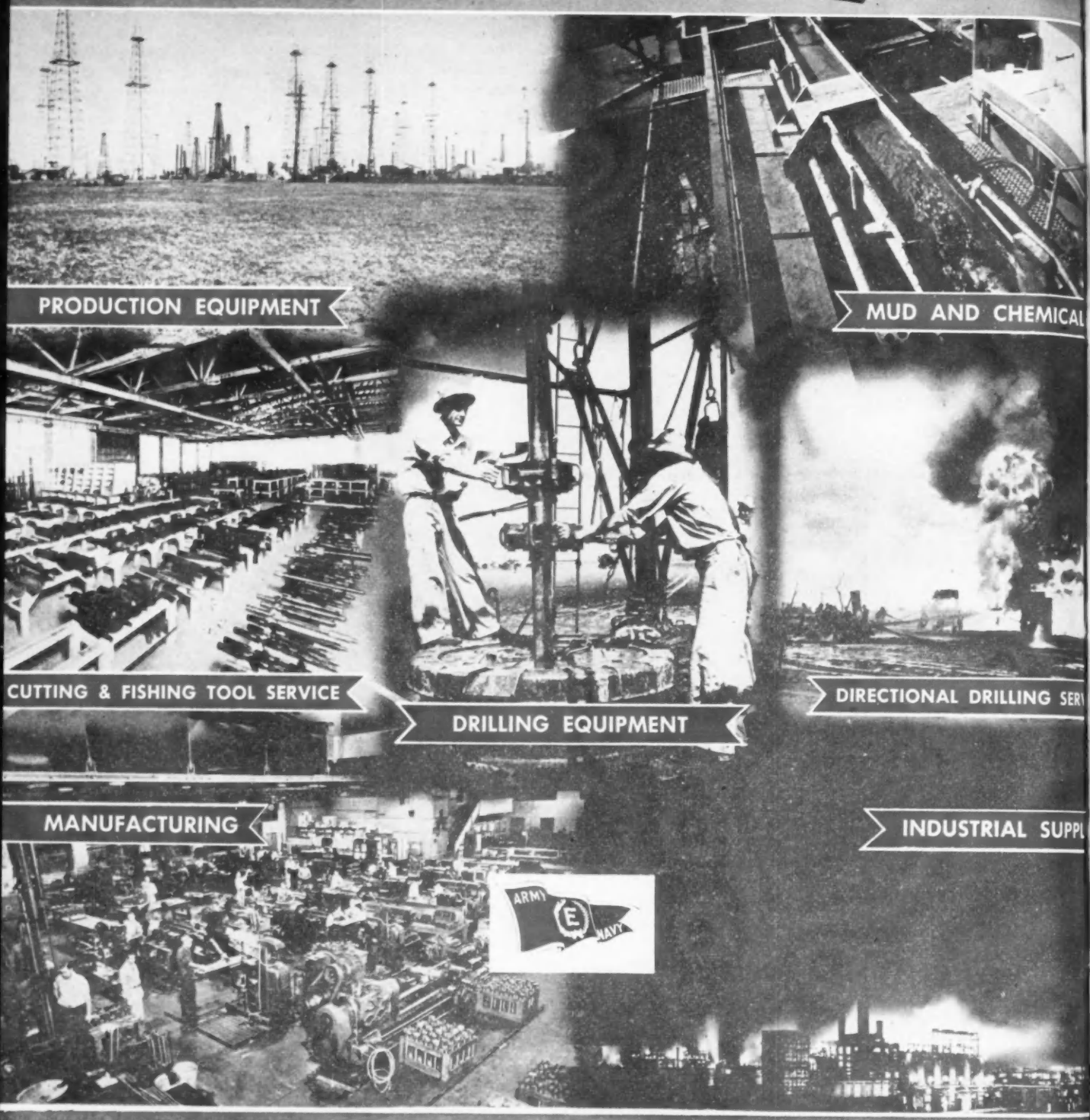

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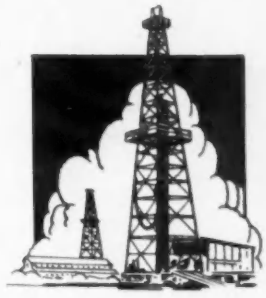

By BERTRAM F. LINZ, Washington Correspondent

BRITISH objections to certain provisions of the proposed bi-lateral agreement last week slowed down the Anglo-American conference on postwar world oil, but State Department officials expressed hope that negotiations could be concluded early this week.

Oil in the Middle East—No explanation of the difficulties which the negotiators had encountered was forthcoming from the State Department, but it is understood they stem from consideration of development of Middle East reserves still more or less in a virgin state.

Congress Back on Job—Congress returned to Washington during the week to remain until it has enacted conversion legislation which will blueprint the transition of industry from war to peace pursuits, but is marking time until committees develop the measures which are to be passed.

War Workers Quitting—Navy needs for tankers and high-octane gasoline and Army needs for fuel, among many other things affected by the manpower shortage in war industries, were strongly stressed in considerations of ways and means to keep war workers on their war jobs in the face of an accelerating desertion by workers anxious to obtain peace-time jobs before the end-of-the-war rush.

Congress vs. Agencies—A special congressional committee, critical of the extra-corporate activities of government corporations, recommended immediate assertion by Congress of complete control of the more than 40 such organizations, including Petroleum Reserves Corporation, which now operate, side by side with the government departments but frequently with more authority and less restriction.

Charges Are Lowered for Atlantic Tanker Movement

Diminished hazards to shipping on this side of the Atlantic are reflected in a widespread revision of rates and general reduction of surcharges for the movement of bulk cargoes by tanker in waters of the Western Hemisphere issued by the War Shipping Administration.

Ten rate schedules, including that for petroleum and products from Pacific ports to Australia and New Zealand, have been cancelled because the movements they originally covered have ceased altogether, and a number of others have been superseded by new schedules.

A new rate order sets up a standard demurrage rate for tankers governed by certain other orders, providing hourly demurrage rate of $60 for vessels under 9000 deadweight tons, $92.50 for vessels of 9000 to 13,999 tons, and $155 for vessels of 14,000 deadweight tons and over.

Plan for Withdrawing Men From Industry Abandoned

The Manning Table plan, which has served as a basis for the orderly withdrawal of workers from war industries into the armed forces, was abandoned by the War Manpower Commission August 3 which, at the same time, announced that replacement schedules for induction of the men will be permitted to expire.

The Manning Table - replacement schedule method of planning releases of men to the armed forces from war plants was instituted by WMC in October, 1942. Recent changes in selective service regulations due to lessened requirements make it no longer necessary to continue the plan, which was used by more than 8700 war plants with nearly 5,000,000 workers.

Maintenance of Stripper-Well Operations After Emergency Studied

Representatives of the industry were told last week that rules for the payment of subsidies on stripper-well oil would be issued by Defense Supplies Corporation within a few days, but that purchasers of such oil could make the premium payments provided for under the plan with assurance that they would be compensated for all payments beginning August 1.

Provisions of the proposed regulations and forms to be used were discussed at a meeting between Secretary of Commerce Jesse Jones and industry and agency officials July 31.

Claims are to be filed monthly and will require a separate listing of all purchases (or of production in the case of producers who refine or otherwise use the oil without selling it) from a particular pool. The claims for each month must be filed before the end of the second succeeding calendar month.

OPA and PAW representatives who attended the meeting explained the steps to be taken to obtain inclusion on the eligible list of stripper-well pools not yet so classified, and DSC officials outlined the manner in which the buyers of the oil would be reimbursed for the premium payments they are to make. Payments will range from 20 to 35 cents per barrel, with a special premium of 75 cents for Pennsylvania-grade oil.

Among the oil men at the meeting were Russell B. Brown, Independent Petroleum Association; W. C. Wenzel, Pennsylvania-Grade Crude Oil Association; J. L. Schumaker, Stanolind Pipe Line Company; T. E. Smiley, Phillips Petroleum Company; F. S. Howard, Humble Oil & Refining Company; J. C. Brooks, The Texas Company; T. A. Van Griethuysen, Continental Oil Company; W. E. Emery, Carter Oil Company; J. P. Moroney, Sinclair Prairie Oil Marketing Company; P. H. Curry, South Penn Oil Company; I. J. Hancock, Union Oil Company of California; R. P. Jackson, Montana Oil Conservation Board, and Richard Fenton, California Stripper Well Association.

As the subsidy plan went into effect, the Independent Petroleum Association announced appointment of a nine-man committee, to be headed by Major B. A. Hardey, chairman of the Louisiana Minerals Board, to study the feasibility of a permanent price differential for stripper-well crude.

Studies will be directed with a view to maintenance of stripper-well operations after the emergency subsidy payments cease, on the theory that production could be maintained and oil conserved if the wells could be kept in operation beyond the time when, under normal conditions, they would be abandoned.

Several proposals to this end have been advanced from time to time, centering around the formation of a "pool" from which bonus payments for stripper-well oil would be drawn.

It has been suggested that such a pool could be patterned after that set up in the early days of the war to meet the extra costs of transportation to the East Coast overland, to which the Eastern selling companies made contributions from which importers were compensated for their additional costs, or that the producing states might

levy a small tax on all production, the revenue going into a "kitty" for the support of the stripper-well operators.

Amendments to List

The OPA during the week made a number of amendments to its lists of pools eligible for subsidy payment and corrected some typographical errors appearing in its original list.

At the same time, it restored the former ceiling price of 98 cents per barrel for the Smackover field in Ouachita and Union Counties, Arkansas, plus 20 cents premium. Originally this field was cut back to 83 cents per barrel, plus the premium, but it was later decided that the intent of the Vinson order is that the subsidy should apply on top of the current prices received at the various fields.

Additions, deletions and changes in rates made by the OPA during the week included the following:

Illinois: Delete Aden (Wayne and Hamilton) 25 cents; Albion North (Edwards) 35 cents, and Mainie North (White) 35 cents. Add: Noble South (Richland) 20 cents.

Indiana: Add Wheeling (Gibson) 35 cents; Trenton Pool, old (Jay, Blackford, Grant, Huntington, Wells, Adams, Wabash, Delaware, Madison) 35 cents.

Kansas: Add all pools, La Bette County, 35 cents; all pools, Montgomery, 35 cents; Halstead (Harvey) 20 cents; Correct Craber (McPherson) to read Graber; Kurich (Rooks) to read Zurich; Smock-Diess (Butler) to read Smock-Sluss; Triss (Cowley) to read Trees.

Louisiana: Increase Pleasant Hill (De Soto-Sabine) from 25 to 35 cents.

Michigan: Correct Grout (Gladwin) to read Grant; Pine River (Gladwin) to read (Gratiot). Add Otisville (Genesee) 20 cents; North Buckeye (Gladwin) 25 cents.

Oklahoma: Add Deer Creek (Grant) 25 cents; Knox (Grady) 25 cents; Little River, East (Seminole) 20 cents. Increase Wetumka South (Hughes) from 20 to 35 cents.

Texas: Add all pools in Callahan County excepting Scranton, 35 cents; Scranton, 25 cents; Lost Lake (Chambers) 35 cents; Marion County, shallow (Marion) 35 cents. Correct all pools in Clay County to delete New York City Strawn and add New York City Mississippi lime; all pools in Coleman County to add Anzac-Morris and correct Boyle to read Gayle; all pools in Jack County Peex to read Peek; all pools Jones County Sagles to read Sayles; all pools Montague County Barners to read Bowers; all pools Shackelford County Joy to read Ivy; all pools Stevens County to add Stroud, deep; all pools Wilbarger County to add Rogers-McCrory; all pools Young County Davis to read Daws; Upton McClester to read Lupton McLester; Padgett to read Padgitt; Servell to read Sewell; add Edmonds and Burns Ragland Strawn. Correct Bateman (King) to read Bateman Ranch (King); Quleta (Bee) to read Tuleta; Nosch (Williamson) to read Noack; Taborg (Pecos) to read Toborg. Delete Heyser (Calhoun and Victoria) 35 cents.

Wyoming: Rate for Poison Spider (Natrona) reduced from 35 to 25 cents.

Help from States

OPA officials will depend on the state conservation authorities for considerable assistance in the handling of applications, and a letter has been sent to the various state bodies explaining that the price agency will depend greatly on their certifications and word as to whether a producing area constitutes a distinct pool.

Producers also are urged to apply to their state authorities for certificates showing whether their leases or individual wells produce from a particular pool.

The Illinois authorities, it was said, have made a complete list of pools eligible for premium payments and the individual leases in each pool, which is proving very helpful.

It was pointed out that a new amendment to the order, effective August 1, provides for the inclusion of fields on an annual basis, and to be computed as the period of one year preceding the date of application. Where a state has certified an entire field and OPA has excluded it on the ground that it produces above nine barrels a day, any individual pool within the field which produces less than that amount may be included, either on the December 1943, or annual basis.

Anglo-American Oil Conversations Hit Snag Reportedly Over Mid-East

Anglo-American discussions of a postwar oil pact have been prolonged beyond anticipations by differences of opinion on certain phases of the memorandum of understanding drafted by the technical groups which met last spring.

State Department officials had no comment on the situation other than to say that the conversations were "making progress", but it was apparent that the proposed bi-lateral agreement which is to be the basis for a world arrangement would not be perfected within the short time originally set.

Reportedly, the British delegation had raised the points on which the discussions slowed down which, again reportedly, concerned the postwar development of Middle East areas which so far have not been exploited.

As the conference opened last month, it was confidently predicted that the agreement would be perfected within a week or ten days, but at the end of the latter period it was admitted the discussions were still going on, although it was then said they should wind up in a day or two.

RFC to Offer No Bargains in Oil, Rubber and Other Surplus Plants

Purchasers of surplus government war stocks may get some good buys as they are put on the market, but there will be no bargains in the shape of rubber, oil or other plants over which the Reconstruction Finance Corporation has jurisdiction, it was made plain last week.

Buyers of such plants, however, will be given fair prices and may be accorded financial assistance where they cannot themselves carry the load, it was announced by Secretary of Commerce Jesse Jones.

Defense Plant Corporation, Jones said, has for some time been engaged in surveys of plants with a view to accelerating their conversion to civilian production. The studies, approximately half completed, include detailed engineering reports on plants, details of cost, photographs, maps, play lay-outs; information on taxes, utilities, transportation and raw materials, and possibilities of convertibility to peace-time operations.

In addition, DPC is analyzing operating costs of different plants in given fields and of different products which are competitive, or potentially so. Where new products or processes have been developed, it is exploring methods of cutting the cost of operation and of improving both products and processes.

"Prospective purchasers of plants should not expect bargains, but will be assured of fair prices," Jones said. "Bargains would prove unfair to the purchasers' competitors and to the taxpayers of the country. While no set formula can be applied as to the sale price of the plants, the salient factors entering in such determination are present reproduction cost, the cost of adaptation to civilian production and the cost of special wartime installations having no peace-time value."

That Jones intends fully to protect the interests of the government is demonstrated by a report showing that so far he has obtained $52,000,000 for facilities which originally cost the Government $59,000,000.

Oil Industry in Class 1 for Heavy-Duty Tire Allotment

With a lack of manpower threatening the production of truck tires, the Office of Price Administration last week cancelled all outstanding certificates for new tires and announced that allocations for civilian operations would be sharply cut, and the War Production Board issued a list of essential services in which the various industries were classified according to their relative importance.

Very few heavy or medium-duty truck tires will be available for at least the next three months, it was warned.

The various essential industries and services were divided into six categories, with all branches of the petroleum industry in Class 1, the top bracket, for over-the-road and off-highway and local wholesale operations, and Class 2B, the third bracket, for local retail delivery service.

So far, it has been impossible to develop any information as to how the small available supply of tires will divide up. All operators whose outstanding certificates were canceled have been given permission to file new applications.

All Steel Steam Towboats To Be Finished This Month

All of the 21 steel Mississippi steam towboats contemplated in the waterways transport program of the Office of Defense Transportation are scheduled to be delivered by August 15, it was announced last week.

Built of steel, nearly 200 feet long and with 2000 horsepoper engines and screw propellors, the boats are being used to tow large cargoes of petroleum and oil products in barges on the Mississippi River and its tributaries.

Each of the 21 craft has been named after an important battle of the present war.

Navy Behind on Tankers And 100-Octane Gasoline

The Navy now has all the submarines it requires, but needs tankers, is seriously short of heavy ammunition, is behind schedule on 40 mm. guns and is "literally scraping the bottom of the barrel" on high-octane gasoline, it was disclosed July 31.

Announcing a cut in the number of new submarines to be built, the department explained that losses have been lighter than expected and the cruising area of the Japanese navy is steadily being cut down.

But the Navy will continue to increase in size at least until the first quarter of 1945, and particularly needed are aircraft carriers, cruisers, new types of assault ships and tankers.

"The farther west the war moves, the greater the strain on our shipping, particularly on our tankers," the department declared. "Our planes flying from Saipan's airstrips and our warships in Saipan's harbors are 1200 miles farther away from our shores than our planes and ships at Kwajalein—1200 more miles over which gasoline and fuel oil must be hauled."

To provide these ships, another 87,000 workers must be found if the accelerated pace of the war is to be maintained, and a prospective steel shortage, especially in plate and sheet, must be averted.

Together with the tankers, the Navy air arm needs high-octane gasoline, and needs it badly, it was disclosed.

"We are literally scraping the bottom of the barrel," it was declared. "Production has been good, but consumption has been enormous. Unless we keep refineries running full blast, some of our flyers may have to go into combat without the added speed which high-octane gas gives them."

PAO Is Modified for Michigan Stray Gas Sands

Another amendment to PAO-11 is about to be issued by PAW, granting automatic authority for the drilling of gas wells in Michigan to the Michigan stray sands on a 160-acre basis. Drilling to these sands, about 1500 feet deep, now is on a 640-acre basis and applications for exceptions must be filed for closer drilling.

The revision will bring conditions in Michigan in line with these in other areas for which similar action previously has been taken and while it may result in some expansion of production, the major objective is to cut down the paper work required of operators. Application for exceptions, however, will continue to be required for the drilling of wells to greater depths.

Regulations relating to drilling in Kentucky, Ohio, Pennsylvania, Missouri, Oklahoma, and New York also are scheduled to be modified in the next few days.

Application for Line

Application has been filed by the United Natural Gas Company for construction of 37.5 miles of 12-inch of pipe line between Beaver County and Venango County, Pennsylvania, represented as required to supplement other facilities recently authorized to permit the company to reecive 10,000,000 feet of gas daily from the Manufacturers Light and Heat Company.

Committee Suggests that Congress Take Control of Federal Corporations

Immediate assumption by Congress of control over government corporations such as Petroleum Reserves Corporation, Defense Supplies Corporation, etc., was urged last week by the joint congressional committee on reduction of non-essential federal expenditures.

Submitting results of lengthy studies by the committee, Chairman Harry F. Byrd of Virginia pointed out that there are 44 government-owned corporations with liabilities of $16,500,000,000, covered by assets the value of which he said will not be known for years to come. These corporations possess borrowing power of $33,000,000,000, plus outstanding loans of $6,500,000,000, are operating at a current loss of nearly $103,000,000, and employ 70,000 officials and employes, who are scattered all over the world.

The report charged that these corporations seem to have been created with little thought to their advantages or disadvantages; some have been set up without capital stock, and others have been established with the idea or even the expressed intention to use up all capital in carrying out their purpose.

It charged, also, that there is no effective over-all control. Alone or in certain groups, these corporations are autonomous, and there has been a growing independence on the part of the corporations to resist attempts of the general accounting office to audit their accounts.

The magnitude of government corporations is now so great as to rival government proper, it was found, and in many cases they exercise power and influence even greater than do departments and establishments. All of this, the committee felt, presents possible hazards to the nation's industries.

"Government corporations to a great degree do business in competition with private enterprise," it was pointed out. "They encroach upon and compete with business, which is under serious disadvantage. They have practically unlimited government credit at low rates of interest; freedom from federal, state and local taxation, except taxes on real estate; and they enjoy the privilege of penalty mail and concessions similar to those enjoyed by regular federal agencies. Add to these the prestige of a government agency and business meets an invincible competitor."

Becomes Assistant to Gulf's Vice President

H. B. Fuqua, chief geologist for the Gulf Oil Corporation in the Fort Worth division for the past 15 years, has been transferred to Houston as assistant to vice president, Joe H. Russell.

H. B. Fuqua

Fuqua joined the Gulf Oil Corporation on February 6, 1922, as district geologist in North Texas, with headquarters in Wichita Falls. On November 1, 1926, he was moved to Fort Worth and promoted to the position of assistant chief geologist for the Fort Worth division. In 1928, he advanced to the position of chief geologist for the division. He graduated from the University of Oklahoma with a degree in geology. He then worked for several major oil firms in Oklahoma and Texas, and later did consulting work before joining the Gulf organization.

Gasoline Supplies to Be Short Throughout Nation

Gasoline supplies for motorists will be tight on the East Coast until winter and will be short throughout the nation because of the increased diversion of motor fuel to military uses, it was warned August 3 by Deputy Administrator Davies.

However, Davies said, supplies should be adequate to meet rationed demands, and local shortages which recently have made their appearance at various points in the East are being remedied by diversions of gasoline from areas with high inventories. In another move to relieve the situation, PAW has started movement of gasoline through the Little Big-Inch, heretofore carrying only fuel oil, but it will require at least a month to accumulate and move the shipment.

Nearly 15,000 cars have been diverted to other service since June, 1943, when 74,000 tank cars were hauling oil to the East Coast, it was disclosed. About half of these cars have been taken away in the past few weeks to meet the increasing need for oil on the Pacific Coast.

Patent Contracts to Lose Restrictive Provisions

Creation of a committee to eliminate restrictive provisions from patent contracts entered into between American concerns and foreign owners of petroleum and other patents which have been seized by the government has been announced by Alien Property Custodian James E. Markham.

The committee also will have the responsibility of renegotiating with exclusive licensees under formerly enemy-owned patents for their release from payment of further royalties in exchange for the release by them of their exclusive rights, making the patents involved in such licenses freely available to all potential users.

Since our entry into the war, the APC has taken over some 45,000 patents owned by nationals of enemy and enemy-occupied countries. The main job of the committee will be the elimination from all patent agreements of restrictive arrangements which limit production or use of the patented product or the sales territory of the patent licensee.

Allied Bombing Reduces German Oil Supply and Military Starts to Limp

Germany's oil situation today is at its most precarious point as a result of four months of systematic Allied attacks, and the Nazi military machine is beginning to limp, it was disclosed July 31 by Foreign Economic Administrator Leo T. Crowley.

German production of natural and synthetic petroleum products, as recently as April of this year, was still high enough to enable the Germans not only to supply all essential needs, but also to increase their reserve stocks substantially, Crowley pointed out in an analysis of conditions within the Reich.

"In less than four months, production has now been reduced by Allied bombing to a point where it falls far short of meeting minimum essential consumption needs, even after drastic curtailment of important war uses," he said.

"Beginning in April, increasing in May and reaching an even higher scale in June and July, a systematic campaign of destruction of the crude oil refineries, the hydrocarbon syntheses plants, and the great hydrogenation plants in Axis Europe has been undertaken. Although Germany has countered with restrictions so drastic that she has even retarded her war industries and war agricultural programs, she still must draw heavily upon the limited reserve stocks previously accumulated."

Production Cut in Half

Crowley estimated that Germany's total production of liquid fuels and lubricants, including such gasoline substitutes as alcohol, is today much less than 50 percent of what it was in April. Production from synthetic plants is less than 60 percent of the April rate, he said, while the crude oil refineries have been hit so hard that their production rate at best is only 40 percent of what it was four months ago. As a result, Germany can refine only two out of every five tons of her crude petroleum.

"Germany is now facing her most critical oil shortage," said the administrator. "At the beginning of the war she had built up substantial stockpiles. Whatever oil she consumed in the early stages of the war, she was in the main successful in replacing with oil seized from the occupied countries. It is true that Germany failed to obtain the rich oil fields of the Caucasus, but she was able to recover from this setback by expansion of those oil-producing resources available to her."

Precison Bombing Hurts

The important German refineries are located in the Hanover and Hamburg areas of Germany proper, in the Vienna area and in the Ploesti area of Romania. Her great and intricate synthetic oil plants, some of which cover four to five square miles and produce many by-products in addition to oil for the Nazi war machine, are concentrated mainly in the Ruhr Valley, the Leipzig area and in Silesia; these plants were greatly expanded whenever possible after the outbreak of the war, and especially after it became apparent to the Germans that they would be unable to seize the oil of the Caucasus, and accounted for approximately half of Germany's oil products.

"Before April of this year the damage caused by Allied bombings had not had a serious effect on Germany's oil supply," Crowley explained. "Repairs to those synthetic plants and crude oil refineries accessible to Allied bombers could be made with relative speed. Moreover, there was available in the western Axis and occupied countries considerable excess refining capacity. Crude oil could thus be diverted from damaged to undamaged refineries.

"But with the advance of the Allied armies, the further development of precision bombing, the establishment of the shuttle-bombing bases in Russia and other factors, many additional plants became exposed to systematic attack from the air. Furthermore, the Germans are no longer in a position to repair promptly the damage done to the synthetic plants and crude refineries. This is due to critical shortages in replacement equipment such as control instruments, pumps, compressors, motors, and many other specialized items needed in these complex plants, and above all, to lack of technical personnel."

Record Run in July

Bayou Pipe Line System set a new delivery record for July by pumping a daily average of 64,569 barrels of products from Houston-Texas City and Beaumont-Port Arthur refineries into the Plantation Pipe Line terminal at Baton Rouge. Products moved during the 31-day period included 1,492,443 barrels housebrand gasoline; 397,737 barrels premium gasoline and 11,470 barrels kerosine.

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED August 5	July 29
Alabama	150	100
Arkansas	80,500	80,500
California	858,100	855,500
Colorado	8,600	8,900
Florida	50	50
Illinois	206,100	208,200
Indiana	13,500	12,750
Kansas	240,500	279,200
Kentucky	24,900	23,150
Louisiana	361,800	359,800
North Louisiana	72,800	72,800
South Louisiana	289,000	287,000
Michigan	50,900	49,700
Mississippi	47,100	45,100
Missouri	100	100
Montana	21,750	23,600
Nebraska	1,000	1,000
New Mexico	108,600	108,600
New York	12,100	12,750
Ohio	7,450	7,750
Oklahoma	339,100	339,500
Pennsylvania	28,500	34,400
Tennessee	35	35
Texas	2,108,900	2,065,000
Upper Gulf Coast	535,200	531,400
East Texas Field	371,800	363,650
Rest of Eastern Texas	147,700	148,000
Lower Gulf Coast	224,900	216,800
Southwest Texas	77,400	78,600
South Central Texas	19,300	21,000
West Texas	484,900	463,050
North Texas	148,800	151,500
Panhandle	98,700	91,000
West Virginia	8,000	8,500
Wyoming	93,450	87,850
Total United States	4,621,185	4,608,885

Senator Gillette to Ask For Rubber Investigation

A new investigation of the rubber situation shortly will be undertaken by the Senate subcommittee on farm crop utilization, aimed at obtaining a further expansion of the grain alcohol program, it was disclosed August 4, by Chairman Guy Gillette of Iowa. Gillette will base his inquiry upon the whiskey "holiday" and the August-September cutback in rubber production to provide aviation gasoline stock.

"The continued operation of the alcohol butadiene plants at maximum rating and the very definite losses resulting from diversion of August production to the requirements for beverage alcohol will very probably result in the reduction of our alcohol stock pile as of September 1 to less than 40,000,000 gallons," he charged. "WPB's program has always maintained the necessity for a 100,000,000 gallon stock pile for national safety. This figure is justified by the needs for protection against current needs and against emergency requirements of unforseen catastrophe.

"Should there be no change in existing requirements and predicted supplies, this perilous situation will continue until 1945 whereas simple precautionary plans would make available resources which would insure satisfactory supplies for all needs."

The precautions suggested by the senator would be in the form of new government plants for the production of 50,000,000 gallons of alcohol from grain annually.

"It is to be expected that the WPB itself is not composed of men all of whom are qualified by interest or training to evaluate the social values of this program and are over-impressed with the claims that are made that grain supplies are at the present moment short," Gillette commented. "With this attitude, it is likely that should these men recommend new production facilities to meet the alcohol needs, their recommendation would likely take the form of further construction based upon petroleum as raw material."

"Cap" Nowery Retires

Sun Oil Company announces that Ellsworth S. Nowery, known throughout South Texas, as "Cap," has retired from active duty. He has been superintendent of drilling and production in the Beaumont division, for Sun. Born in Parkersburg, West Virginia, "Cap" commenced his oil field experience as a tool dresser, in 1894. After working in the oil and gas fields of West Virginia, he came to South Texas in 1907 and entered the employ of Sun Oil Company.

"Cap" plans to keep in touch with the company's activities but first will take a vacation.

Nowery will be succeeded by Donald D. Braugh who has served as his assistant and has had a long and varied experience with the Sun Oil Company. Braugh is a graduate in geology and engineering from the University of Oklahoma. He started with Sun Oil Company in 1925.

Braugh has named Harold Denton and Byron Wiess as his assistants, both of whom have been with the company for many years.

Navy Asking Bids on 2½ Million Barrels of Crude Oil in California

Bids for the sale of approximately 2,500,000 barrels of crude oil, representing the additional production expected during the last half of this year under legislation authorizing the Navy to increase the output at Elk Hills, will be opened by the District Supply Officer of the Navy Department in San Francisco August 15.

While a general invitation to bid has been extended, the oil actually will be sold only to a purchaser who can produce military products, especially 100-octane aviation gasoline, Navy fuel oil, and 80-octane all-purpose motor gasoline, required by the increased tempo of war in the Pacific.

All bidders must submit in advance of the public sale a statement setting forth, among other things, the refining and other facilities owned, controlled or available for use in delivering the military products manufactured from the Elk Hills oil; the availability of experienced operating personnel, and the ability of the refiner to utilize fully the facilities and personnel available in the production of refined products needed in the Pacific.

While bids are to be submitted in writing, the Navy is urging bidders to have representatives at the opening in order that each may have the opportunity, after hearing the bids read aloud, to raise his price and otherwise increase the value of his bid.

New High-Cetane Fuel for Diesels Undergoing Tests

A new high-cetane diesel fuel, which gives promise of having revolutionary effects, is now undergoing extensive tests in Navy laboratories, it was disclosed last week.

The tests are being conducted to determine the value of the fuel for combat service for both present and possibly new design Navy engines. The immediate use of the new fuel lies in improving the quality of low-cetane fuels and augmenting the present supply of fuel for the many diesel ships in the U. S. fleet, it was said. Its future possibilities appear to be very promising, since it may make 100-cetane fuel practicable where 50-cetane is now the average for high quality diesel fuel.

The new high-cetane fuel is produced from a fluid obtained by synthesizing natural gas. The quantity of fuel which can be obtained from this source, however, represents only a small fraction of the total fuel production now obtained from natural petroleum but, used as a blend, it can have important effects in improving the quality of the present low-cetane petroleum fuel and increasing the over-all volume of diesel fuel available for the fleet.

A cheap source of the basic high-cetane fluid is natural gas now vented into the air or wasted in uneconomical uses. The process by which it is produced requires a minimum of critical alloy steel and will employ catalytic technology developed by the synthetic rubber and aviation gasoline programs. The work now under way indicates that this process will make a considerable quantity of a valuable war fuel available to aid in relieving the critical shortage of petroleum products.

Natural Gas Association Favors Control by States

Federal control of the natural gas industry was scored by the directors of the Independent Natural Gas Association at a meeting in Tulsa, Oklahoma, during which the directors went on record as favoring placing in the hands of state authorities the power to regulate the production, conservation and transportation of natural gas. The directors authorized necessary action to promote the use of natural gas and the extension of pipe lines and other facilities to available markets.

The firm of Wheat & May of Washington, D. C., was retained to represent the natural gas industry in the case of the Memphis Gas Company before the Federal Power Commission, litigation of widespread importance involving enlarging the company's transmission system, and also approved employment of counsel to be located at Washington, D. C., whose duty would be to represent the natural gas industry.

Two Books Discuss Postwar Problems

The Committee for Economic Development has released two books in its series of studies on postwar economic problems: "Production, Jobs and Taxes," by Harold M. Groves, professor of economics at the University of Wisconsin, shows the important role federal taxation can play in achieving high levels of production and encouraging business to create job opportunities. The way in which taxation affects initiative is given careful analysis, and the author proposes specific changes that would provide a tax program favorable to high production and high employment.

"The Liquidation of War Production," by A. D. H. Kaplan, economist on leave from the University of Denver, is a study of the cancellation of war contracts and disposal of government-owned plants and surpluses. The author has analyzed the nature and scope of the problems that will confront the nation. He points out the factors that will have to be given greatest emphasis and the likely conflict of interests. He indicates the criteria by which decisions should be made, and the responsibilities that will fall on business as well as government.

The McGraw-Hill Book Company, 330 W. 42nd. Street, New York 18, is distributing the books. Groves' book is $1.25, and Kaplan's, $1.50.

More Hawkins Field Oil Allowed Humble Company

The Texas Railroad Commission has radically revised its proration order on the Hawkins field, Wood County. The new order, allocating much more oil to leases held by Humble Oil & Refining Company, was effective August 5.

Humble leases now will get 72.7 percent of the total allowable. At a recent hearing the company contended that since it owned 76 percent of the reserves, it should get 76 percent of the allowable. However, the Commission's order gave Humble only 66 percent, which the company said resulted in the loss of 4500 barrels of oil daily.

The allowable for townsite wells on small tracts is cut to 47 barrels per well, a loss of 17 barrels. Out in the field a well on 40 acres will get 188 barrels daily. There is no change in the allowable for wells on 20 acre tracts.

Humble complained at the hearing that although Commission regulations permitted drilling of one well to 20 acres, PAW restrictions prevented drilling more than one well on 40 acres. Since Commission orders gave no credit for the extra underdrilled acreage in the allocation formula, the company had no recourse other than to ask for a change.

This is the first time an allocation formula has been based on the emergency. The order provides that "for the period of the war emergency or for the period of PAW restrictions on drilling, and for a period of not to exceed six months following the termination of said emergency or the lifting of the PAW restrictions on drilling, any well which as a result of such restrictions has been required to have available for assignment to it not less than 40 surface acres may receive credit in the allocation program for the entire 40 acres so long as the two points farthermost removed from each other and contained in such drilling unit are not in excess of 2087 feet apart."

The Commission continued its order limiting the unit to 20 acres, but made the exception for the emergency and six months. In its findings of fact that Commission pointed out that one well to 20 acres is needed to drain the field adequately. Therefore Humble would have to drill to this density when materials become available.

Gilcrease and Associates Buy Osage Valley Company

Valley Osage Oil Company of Tulsa has been taken over by Thomas Gilcrease and Associates of San Antonio through a stock transaction involving close to one million dollars. Executive and operating departments of Valley Osage Oil Company will be moved to San Antonio. At a reorganization meeting held in Tulsa August 3, Gilcrease was named president, succeeding William A. Goforth; E. L. Ames, first vice president; T. H. Gilbert, second vice president and C. A. Stolt, secretary.

☆

A. L. BURCH, assistant production superintendent at Tulsa for Ohio Oil Company, will organize an Eastern-Maryland division for the company and has left for Findlay, Ohio.

Another Valuable "How" Article

How to Determine Proportions of Sucker Rod String

By E. N. KEMLER

Professor of Mechanical Engineering, Purdue University

THE design of a string of sucker rods involves two problems, first the determination of the size of rods which are to be used, and second the determination of the amount of each size of rods in case a tapered string is to be used. For shallow wells the smallest size of sucker rods available is usually used. In this case there is no alternative but to use an entire string of that size of rod.

Savings Possible

In the case of deeper wells where larger rods are used, it is possible to make appreciable savings by using smaller diameter rods on the lower part of the string. The high expense of dies and gages necessary for the manufacture of sucker rods together with increased cost of manufacturing and stocking, handling, etc. in smaller lots has limited the number of sizes of sucker rods to ⅝, ¾, ⅞ and 1-inch diameters. The practical factors which limit the number of sizes of rods to this number makes possible a definite procedure in determining the proportion of sucker rod strings and also in determining the sizes which should be used.

The problem of determining the amount of each size of rod involved in a tapered string can be determined mathematically. Fortunately the analysis of this problem leads to some rather definite values for different sizes of rod strings and permits the easy determination of the sizes. Table 1 lists the percentage of each size of rod in a string based on the assumption that the loads at the top of each new section are such as to give the equal stresses.[1]

Applying the Chart

The application of data given in Table 1 can be made directly or by use of a chart such as is shown in Figure 1. Assume for example that a ⅞-¾-⅝-inch tapered string is to be used in a 3100-foot well. From Table 1, 28 percent of the string is to be ⅞-inch rods, 33 percent ¾-inch rods and 39 percent ⅝-inch rods. This would give 868 feet ⅞, 1023 feet ¾ and 1209 feet ⅝-inch rods. Inasmuch as standard lengths are involved there is no need to carry out the calculations so accurately. Figure 1 has been drawn to give the feet of rods when the percentages are known. The example shown on the chart uses the same values as above. The feet of rods are determined by entering the chart at the bottom at the well depth in 1000 feet, tracing up to the percentages as found from Table 1 and then across to the lefthand scale. The values from this example show approximately 870 feet ⅞, 1025 feet ¾ and 1200 feet ⅝-inch rods which checks reasonably accurately with the required total.

Determining Sizes

The problem of determining sizes of rod to use in a string is much more difficult. The size of rod can be determined from the relation that stress times rod area equals load that can be carried. Table 2 lists various sucker rod constants for the sizes of rods normally available. If the working stress in pounds per square inch is multiplied by the area of the rod in square inches as given by Table 2, the resulting load which these rods can carry can be determined. The physical properties of representative sucker rod steels avail-

TABLE 1

Rods in String	Percent of Various Sizes				Average Wt./Ft.
	1"	⅞"	¾"	⅝"	
1"—⅞"—¾"	32	32	36	..	2.15
1"—⅞"	47	53	..	..	2.43
⅞"—¾"—⅝"	..	28	33	39	1.62
⅞"—¾"	..	46	54	..	1.93
¾"—⅝"	..	..	46	54	1.38

TABLE 2

Constants for Sucker Rods

Rod Size	⅝"	¾"	⅞"	1"
Area of Body of Rod in Sq. In.	.307	.442	.601	.785
Weight in lb./ft.	1.15	1.64	2.26	2.88
Stretch in inches/lb. Load per 1000 ft.	.00130	.000905	.00066	.000510

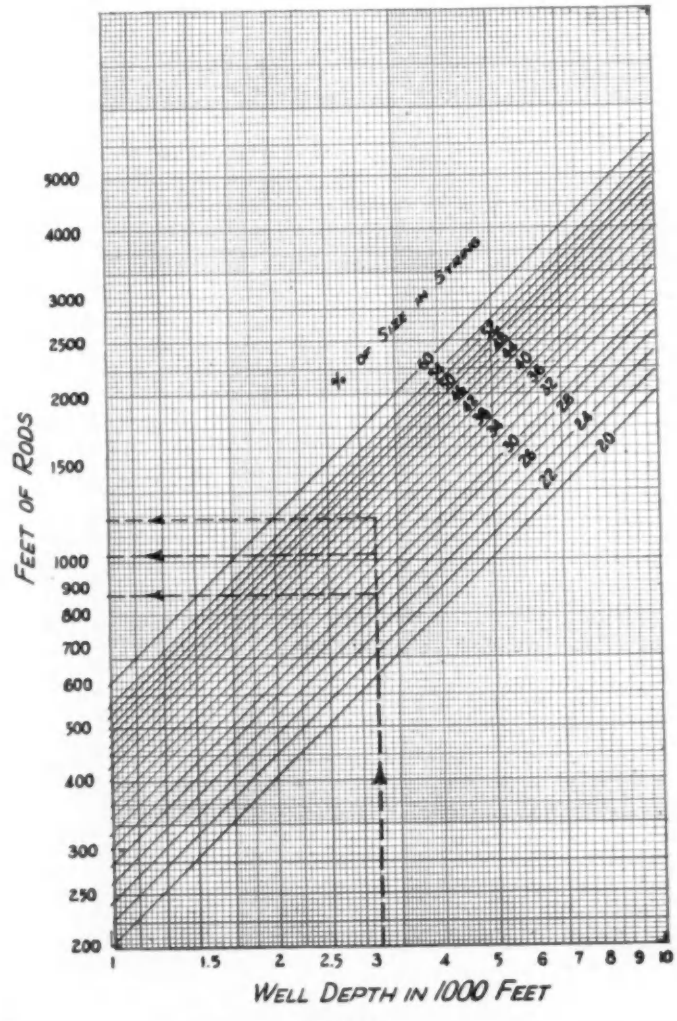

FIGURE 1

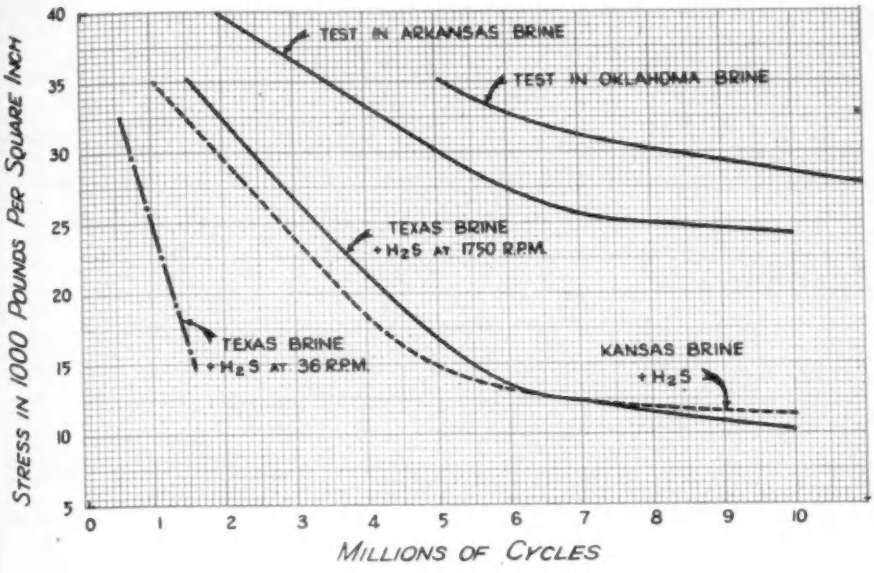
TEST IN ARKANSAS BRINE
TEST IN OKLAHOMA BRINE
TEXAS BRINE +H2S AT 1750 R.P.M.
TEXAS BRINE + H2S AT 36 R.P.M.
KANSAS BRINE +H2S
STRESS IN 1000 POUNDS PER SQUARE INCH
MILLIONS OF CYCLES

FIGURE 2

operated in air. The corrosion endurance limit represents the corresponding value when the specimen is rotated in a solution of oil-well or equivalent brine. The third column represents the endurance limit when the specimen is rotated in a brine which is saturated with hydrogen sulfide gas. This gives a very severe corrosion condition and is called the sulfide corrosion endurance limit.

Tests in Brine

Figure 2 shows the results of some tests which have been made on sucker rod steel in various types of brine.[3] It will be noticed that the test made with the specimen in Oklahoma brine shows a relatively high endurance limit. The test in Arkansas brine shows a lower value. The test with Texas and Kansas brines were made under conditions where these brines were saturated with hydrogen sulfide gas. The tests under these conditions show a much lower fatigue limit. These four tests were made with the samples operating at 1750 revolutions per minute. Also on this curve is shown the same steel subjected to Texas brine saturated with hydrogen sulfide when rotated at 36

■ CONTINUED ON PAGE 36

TABLE 3

Comparative Physical Properties of Some Typical Sucker Rod Steels

STEEL	Tensile Strength	Yield Strength	Elongation Percent in 2 Inches
SAE 1035	88,500	55,500	31.3
SAE 3130	100,500	81,900	27.8
SAE 4615	84,700	58,500	29.0
1.25 mg	100,000	71,300	28.8
1.75 mg	118,200	72,900	23.5

able today are listed in Table 3.[2] The second column lists the tensile or breaking strength in pounds per square inch. The third column lists the yield strength in pounds per square inch, and the fourth column lists the percent elongation in two inches. This elongation value gives some idea as to the ductility of the steel. A steel giving a high elongation will yield more before breaking and therefore is better where shock loads are experienced.

Fatigue Properties Listed

Table 4 lists the fatigue properties of these same sucker rod materials.[2] These fatigue values have been determined by subjecting a specimen of the steel to a bending load and then rotating the specimen. As the specimen rotates the load is then changed from compression to tension every half revolution and the fatigue properties of the steels under these conditions are then determined. For the conditions under which sucker rods are used, the fatigue value should be slightly higher because the range of stress is not as great. The air endurance limit represents the stress at which rods when subjected to the alternate bending and tension and compression due to bending will fail when

TABLE 4

Fatigue Properties of Some Sucker Rod Steesl

STEEL	Air End Limit	Corrosion End Limit	Sulfide Corrosion End Limit
SAE 1035	40,600	24,600	10,600
SAE 3130	55,100	31,600	15,900
SAE 4615	48,600	23,100	19,900
1.25 mg	48,900	19,600	14,600
1.75 mg	56,400	29,400	12,100

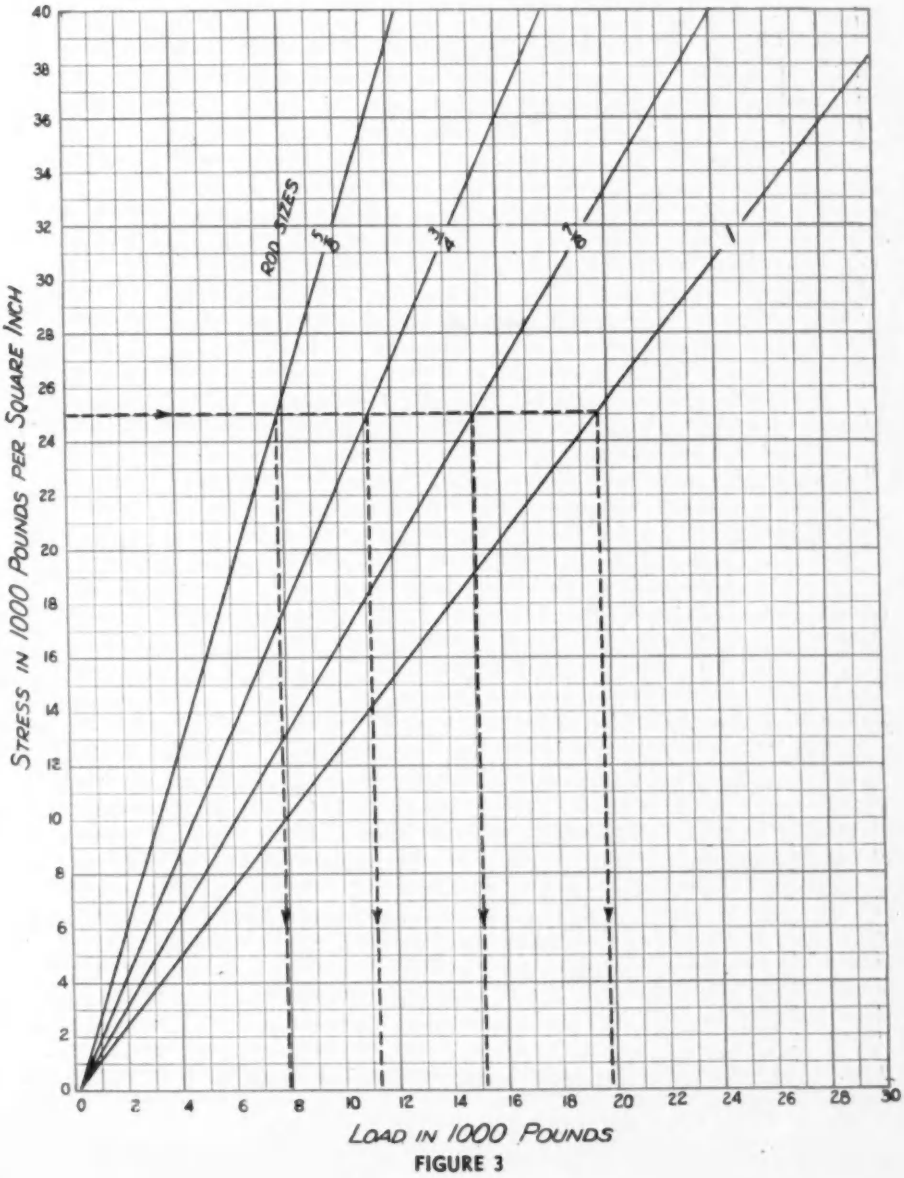

FIGURE 3

Operators Using Orifice Buttons To Cause Wells To "Kick Off" and Flow

Practice becomes common in Gulf coast to inject buttons into well tubing by gun or mechanical perforator and this permits gas in annular space to enter tubing and lift the fluid there to the surface. Wells thus flow without expense of even pulling tubing string

By D. D. KINLEY, M. M. Kinley Company

DURING recent months it has been common practice in many Gulf Coast oil fields to use orifice buttons injected into the well tubing by gun or mechanical perforator run from the surface on a wire line. Then gas in the annular space between the tubing and casing can enter the tubing to lift the fluid in the tubing from that point to the surface, thus "kicking off" a well which will not flow without assistance.

In some instances gas from outside sources is applied to the casing and the orifices act as gas jets lifting the fluid in the tubing. This practice has enabled many operators to continue flowing wells, which have ceased to flow from their own formation pressure, without even pulling the tubing string, which has not only reduced expense, but in these days of material and labor shortages has had additional benefits. Several other uses for the technique have been made.

Operation of Perforators

Two types of perforator for placing these buttons in the tubing have been developed. One of these utilizes the force of a small charge of powder to drive a wedge downward forcing the button into the tubing, while the other forces a wedge down by the action of a set of jars manipulated by the wire line at the surface. Each accomplishes substantially the same result.

Both types of perforators are run on a wire line through a stuffing box using a lubricator above the tubing gate valve. A separate run is required for each button to be put in the tubing, but the time for the entire operation can be measured in hours. All necessary equipment is mounted on a light truck, which can be moved readily from location to location.

The well must be shut in during the operation, but the lubricator can be mounted on any regular Christmas tree without additional equipment. The full size of the gun (1¾-inch for 2-inch tubing) requires that the hole be free from obstructions such as paraffin or a short bend in the tubing, in order that it can be lowered. The diameter of the perforating gun necessarily is large so that the button can be pushed into the tubing until it is flush. No projection is left in the tubing to obstruct swabbing, paraffin cutting, taking bottom hole pressures, or any similar operation.

When the depth where it is desired is reached to place orifice button, the explosive or gun perforator (shown in Figure 1) is set in a collar by pulling up and breaking off a spring blade which lets a metal dog come out set in the collar of the tubing when the perforator is lowered, preventing further descent. Then the action of the jars is used to shear a safety pin and then to strike a primer which sets off a charge of powder, forcing the wedge down and pushing the button into the tubing. The wedge continues down until the recessed portion is opposite the piston, allowing it to return into the body of the gun. The force which pushes the button comes from the wedge and not directly from the powder. The high point of the wedge governs the distance which the button jets into the tubing. Thus it is impossible to force the button completely through the tubing by using the charge of powder.

Mechanical Perforator

Same results are accomplished with the mechanical type perforator, which is set on slips (Figure 2) and uses the action of the jars to force the wedge down. On the lower end of this perforator is a removable stop which serves as a base for the tool to work against. By manipulating the wire line at the surface, the stop can be made to set at any desired depth; after which downward motions of the jars are made to cause the orifice insert to be driven through the tubing walls.

The button is locked firmly into the tubing with either type perforator. However, with the mechanical perforator the hold is made firm by crimping the edge of the tubing around the button (Figure 2A.) By the explosive method using a slight taper on only a portion of the button, a disc is pushed out of the tubing slightly smaller than the largest outside diameter of the button, and is pressed firmly into this opening so quickly that the tubing is unable to give (Figure 1A). For test purposes blank buttons have been placed in sample tubing and pressure up to 5000 pounds have been put against them with no leakage.

The buttons are 5/16-inch in diameter and 7/16-inch long. There is a slight taper on the buttons to assure a firm hold in the tubing, holes are drilled through the buttons in sizes from 1/32 to 5/32-inch allowing any size orifice in this range to be placed in the tubing. They are made of a special steel and hardened to more than 500 brinell giving a high degree of resistance to wear from the friction of the flow of gas or fluid through the orifice. A recent refinement has been to drill the holes in the buttons at a 20-degree angle so that the gas enters the tubing shooting upward and strikes the opposite wall of the tubing at an angle, thus lessening wear of the tubing from the jetting action of the orifice.

No specific formula has been found for determining at what depth the buttons should be placed and what size orifices they should have. In oil-field practice there are so many variables such as the weight of fluid, size of tubing, size of casing and pressure and amount of available gas that each well becomes a separate problem. However the same principles are applicable that have been used in the placing of flow collars or other similar devices. The normal fluid level of the well in both the tubing and the casing are of great value, and there are available convenient means of determining them.

The largest use of the new technique has been to assist wells to flow which have just ceased natural flow and need only slight help to continue flowing. If the well has sufficient pressure on the casing this can be done without the addition of gas from outside sources. In some cases it is necessary to add gas to the casing in order to "kick" off the well. However, the use of these buttons in marginal wells frequently has allowed an operator to lower the line pressure in his gas system when it had previously been necessary to carry a substantial pressure in order to "kick off" a few wells. Where there is a substantial bottomhole pressure and high fluid level, the utilization of just the normal casing pressure, by placing one or two buttons has enabled wells to continue flowing

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since they only required slight assistance to start flowing action, which would then continue without assistance from outside gas as aerated fluid entered the tubing.

Occasionally, where a packer has been placed between the casing and the tubing, it is necessary to retain a specific amount of fluid above the packer to hold it expanded. The amount of fluid necessary can be calculated and orifice buttons still used for lifting the well by placing them in the tubing above the amount of fluid calculated. By applying gas to the casing at the surface all the fluid in the casing above the button will be forced through the button into the tubing, leaving sufficient fluid to hold the packer, but providing lifting action in the tubing from the gas applied at the surface. Many wells have ceased flowing not so much from a drop in bottom-hole pressure as the encroachment of water requiring greater lifting force. Here again the assistance of the button will enable the well to continue flowing frequently without the addition of outside gas and eliminating the necessity of constantly swabbing the wells to start natural flow.

More Buttons Used

As a well requires more and more assistance to continue flow, more orifice buttons can be added. An intermitter can be placed on the flow of gas into the casing to maintain an economical gas-oil ratio. Conceivably a well could be carried to depletion in this manner. In actual practice however, this will seldom be found economical.

The argument may be advanced that, since pumping or gas lift equipment will have to be installed eventually, it should be installed immediately and the expense of installing orifice buttons saved. However, since the proper application of these buttons may delay even pulling the tubing for a matter of years, it can readily be appreciated that the interest on the investment required in purchasing and installing lifting equipment and the depreciation of this equipment plus the difference in lifting cost over the interval from the time natural flow ceases to the ultimate installation of lifting equipment, will pay out considerably more than the small cost of installing orifice buttons.

By reversing the taper of the button a full ¼-inch hole can be perforated in the tubing since the largest part of the button has cleared the tubing before the action of the wedge is completed. This puts a hole in the tubing without affecting the casing since there is not suffi-

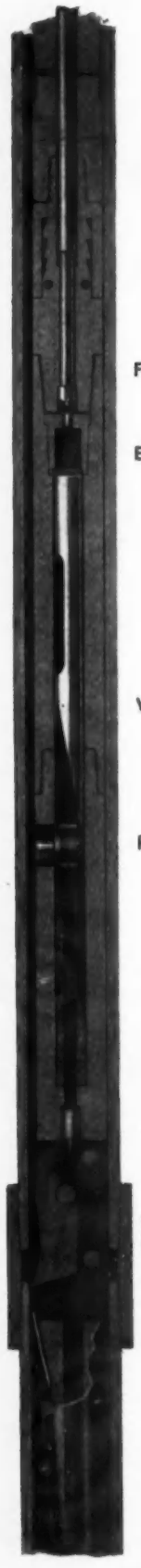


FIGURE 1

Explosive or Gun Type of Tubing Perforator.

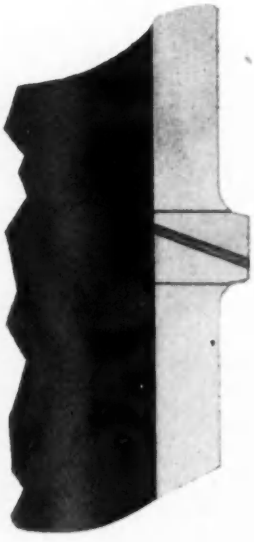


FIGURE 1A

Orifice button inserted by explosive perforator is flush with interior of tubing.

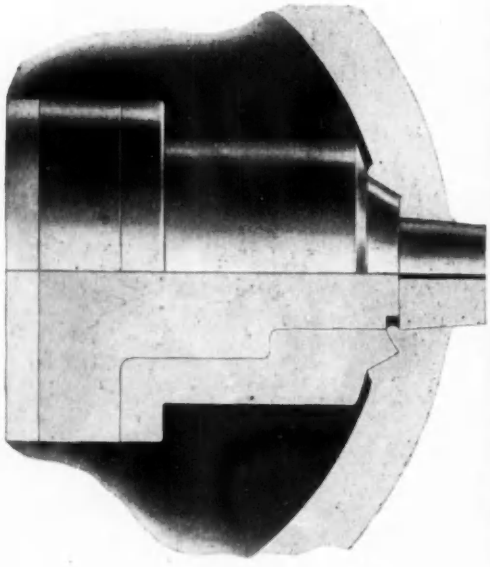


FIGURE 2A

Insert driven through tubing wall by mechanical perforator and locked in place by crimping tubing edge back of insert.

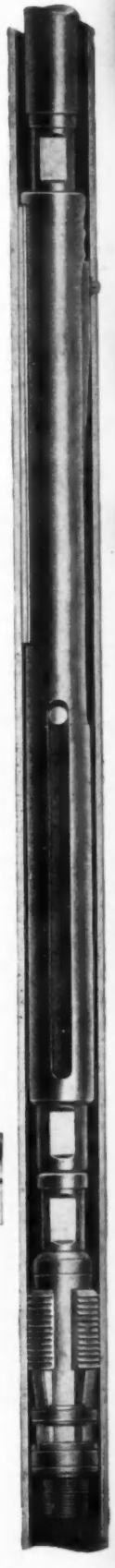
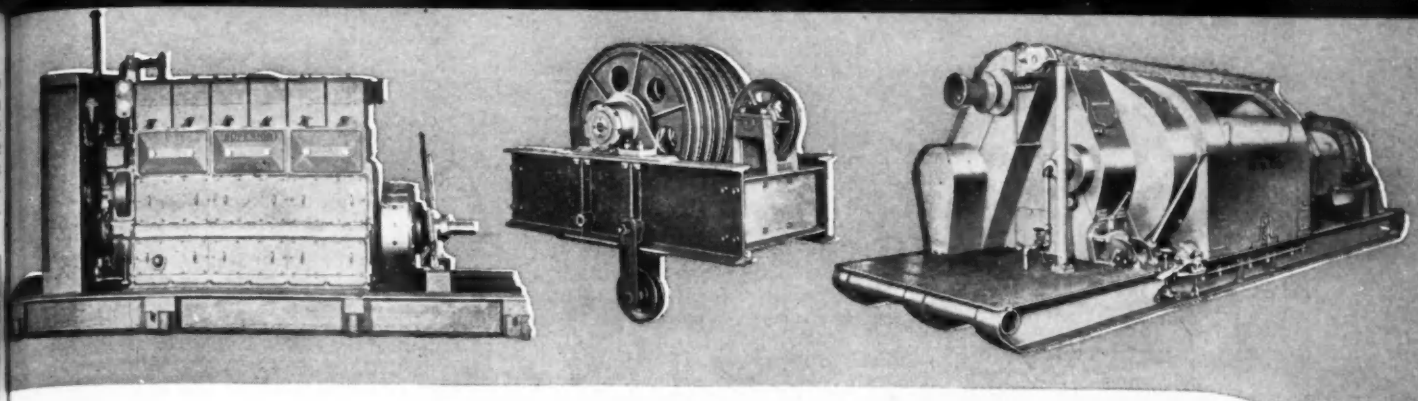


FIGURE 2

Mechanical Type Tubing Perforator.



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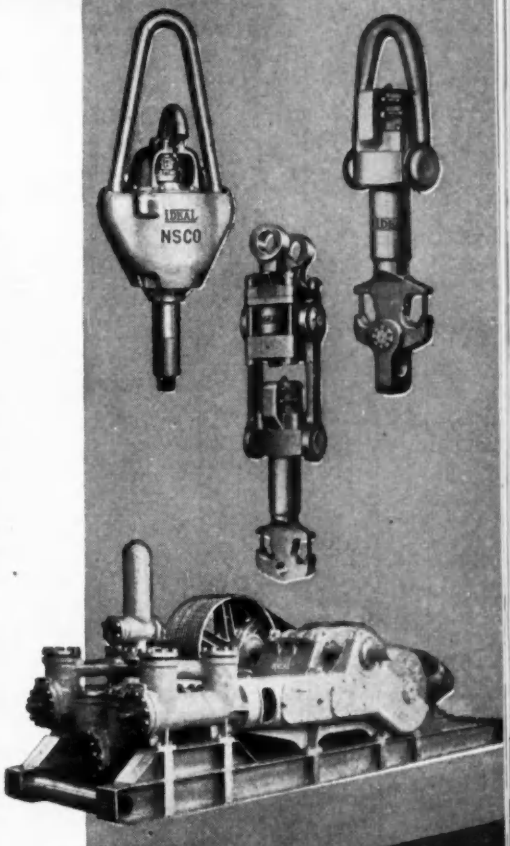

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cient driving force to carry the button beyond the tubing other than a slight momentum. This hole can be used for pumping mud, water or oil through the tubing into the casing in order to kill a well or to free sanded tubing.

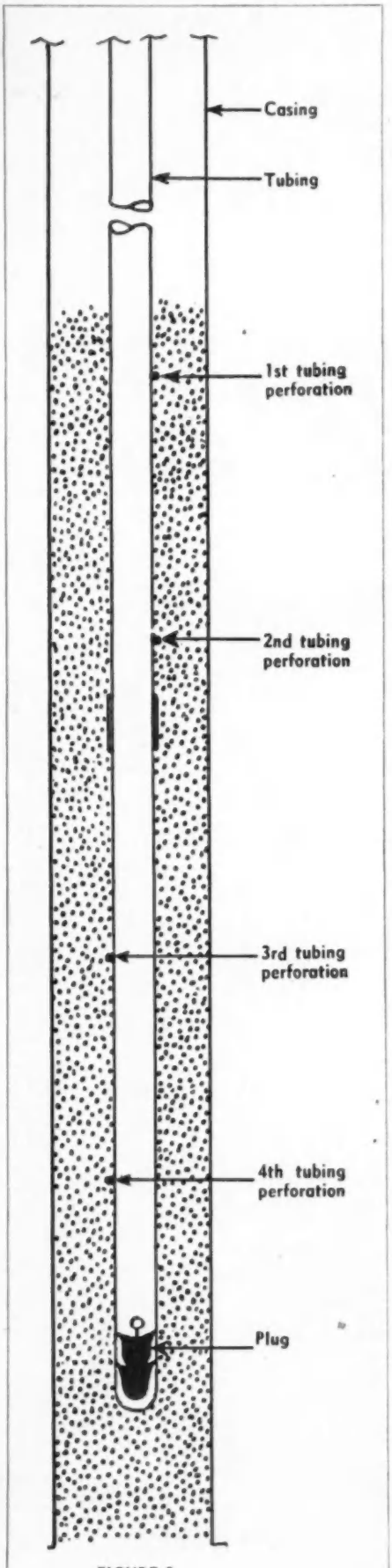

FIGURE 3

This application has been particularly useful in killing dual-completion wells when the upper sand is being produced through the casing, which is packed off from the tubing. The hole is placed in the tubing immediately above the packer allowing mud to circulate back of the tubing above the packer. When good returns are received on the surface this hole can be plugged by pumping a piece of rag down. Then fluid is pumped against the lower producing sand. This same procedure is applicable for killing any well where circulation cannot be obtained around the end of the tubing.

Washing Out Sand Bridges

This method of perforating tubing also can be used to wash out sand bridges between the tubing and casing strings. This is accomplished by perforating in and beneath the bridge and circulating fluid to wash out the sand. An accompanying drawing illustrates this operation (Figure 3). The first step in this operation is to bail the interior of the tubing clean of sand. Then a perforation is placed near the top of the bridge, which may require several attempts before properly located perforations are made. Fluid is then circulated until all sand above this point has been washed out. The process is then repeated at a slightly lower depth. Successive perforations, each time at a slightly lower depth, are made until full circulation is obtained and the bridge removed completely.

In order to simplify the surface installations of dual-completion wells the tubing has been perforated opposite the upper sand allowing the fluid to enter the tubing. Thus the flow from both sands is produced through the tubing. This eliminates paraffin forming in the casing. If it is desirable the tubing could be shut in and both sands produced through the casing. By using an orifice button which remains in the tubing, a choking action could be obtained on either sand depending on whether the well is produced through the casing or tubing.

The orifice button can be used to unload a well which has just been completed or just been reworked, without swabbing. Frequently new or reworked wells do not have sufficient bottom-hole pressure to unload a column of fluid and a swab is used to bring the well in. This swabbing action tends to tear down the walls of the sand formation by creating a powerful suction as the swab is withdrawn. Instead an orifice button can be placed in the well and by applying gas pressure to the casing the well will unload itself with no strain on the sand formation. Then the orifice will be in place to continue to help the flow of the well.

In these days of shortages, operators are continually on the lookout for labor and material saving devices. This new technique is the answer to many a production problem that has previously required a well to be reworked. By this device a troublesome well frequently can be put back on production with no down-time and without even pulling the tubing. The only material loss to the operator is one joint of the tubing for every orifice button placed in the well.

Sucker Rods

■ CONTINUED FROM PAGE 29

revolutions per minute. Because corrosion is so severe when the hydrogen sulfide is present in the brine, the number of cycles to produce failure at a given stress will decrease with the speed since the corrosion increases with time. These values show some of the problems which are encountered in designing a sucker rod string where corrosion is encountered. Where the fluid being pumped is oil and there is no corrosion agent present, stresses as high as 30,000 pounds per square inch can frequently be used with 25,000 pounds per square inch being preferable. Where the corrosion is present but not severe, stresses of 25,000 pounds per square inch would represent the upper limit for long life and 20,000 pounds per square inch would be an upper limit for long life. Where corrosion is severe the working stress must be kept low to insure long life. Values lower than those for normal corrosion must be used if life is not to be too short.

The loads which can be carried by different rod sizes can be determined from Figure 3. This example shown on this figure gives the load in each rod size for a stress of 25,000 pounds per square inch. The ⅝-inch rods can carry a load of 7700 pounds, the ¾-inch 11,100 pounds, the ⅞-inch 15,000 pounds and the 1-inch a load of 19,600 pounds. In the case a tapered string is used the stresses will be approximately the same in the top rod of all sizes.

Formulas Suggested

In cases where the load to be carried by the sucker rod string is not known, empirical formulas must be used to give the value of the load. One formula which has been extensively used is that suggested by Slonneger[4] and is

$$P = (W_r + W_o)\left(1 + \frac{S \times N}{5400}\right)$$

Mills[5] has proposed a formula which fits the peak load encountered and which may be better for this purpose at high pumping speeds. It is

$$P = W_o + W_r\left(1 + \frac{S\,N^2}{70{,}500}\right)$$

where W_r = weight of rod string
W_o = weight of oil on plunger = $0.34\ D^2\ L$
D = effective plunger diameter in inches
L = depth to pump in feet
S = polished rod stroke in inches
N = strokes per minute

The weight of rods in the case of a tapered string designed according to Table 1 can be determined by multiplying the average weight per foot as listed in the right-hand column by the well depth. In case the well is pumping with a high fluid level the weight of oil as given in the formulas can be corrected to the weight of oil above the fluid level.

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Electrical Well Logging

PART 1
Review of Well-Logging Methods

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THE STUDY of the nature of the earth was originated for purely scientific purposes centuries ago by numerous observatories all over the world. The constant desire for more accuracy resulted, by the end of the last century, in considerable improvements in a large number of physical instruments. These improvements, in turn, brought a wealth of information on the constitution of the earth and on its minerals. From these data it soon became apparent that the techniques and instruments used for the observations made on known deposits might be used also for the discovery of unknown accumulations of minerals.

Thus, the foundations of applied geophysics were laid. For a while, the methods and equipment employed for this particular application were those used in geophysical science. It gradually became apparent, however, that better efficiency would be achieved by adapting the observatory apparatuses to field use. Hence, new instruments were built, and new techniques and methods of interpretation were developed. From then on applied geophysics followed more and more independently its own course of development, until a few decades ago, when it was recognized as an independent science.

The primary objective of this new science is geophysical prospecting, i.e., the application of the study of the structure and composition of the outer portion of the earth's crust to certain problems of economic geology. At present, its greatest application in this country is for oil exploration.

This is the first of a series that will constitute the most extensive assembly of information on electrical well logging yet published by an oil magazine. Primary purpose of these articles is to give practical data on the conventional methods of electrical logging. Basic principles underlying the methods are explained in simple terms, thereby answering need for this type of material on well logging. Due to the wide scope of the subject and space limitations, only the usual and the simplest conditions are investigated quantitatively in the series. Qualitative data, however, are given in several exceptional cases.

Classification of Geophysical Methods

Almost since the beginning, the geophysical methods of exploration have been divided into two main classes. The first class comprises those methods of investigation which do not necessitate any man-made field of force for their operation. The second one comprises those for which an artificial field of force is used. This division is rather academic. As a matter of fact it is sometimes difficult to tell whether a method belongs to the first or the second class.* Furthermore, the measurement of a given physical property can often be made by methods belonging either to the first or to the second family.** The above classification, therefore, does not always apply strictly.

The treatises on geophysical exploration usually ascribe the importance of the methods using artificial fields to their well known "depth control". It should not be forgotten, however, that other factors are often responsible for the better resolving power of these methods, for instance, the observation of the building up of certain phenomena, or their disappearance, or their residual effects. These techniques, however, are little used at present, notwithstanding the possibilities of their peculiar properties.

When the physical properties of the earth's constituents are considered, geophysical methods of exploration have been classified into the four following groups listed in order of present popularity in the Western Hemisphere:

1. Seismic methods
2. Gravitational methods
3. Magnetic methods
4. Miscellaneous methods (chemical, electrical, radioactive, thermal—)

In the Eastern Hemisphere, however, during the last 15 years, electrical and magnetic methods received considerably more acceptance than in the Americas.

Surface Exploration and Well Logging

The life of most geophysical methods of exploration is characterized by an adaptation period followed by a peak of popularity. After a number of years of extensive use the commercial possibilities of the technique decreases rapidly. The fall of a method is caused either by the decreasing extension of the areas where it can be successfully applied, or by advent of a more desirable technique.

Well logging, although an outgrowth of surface exploration, did not follow this trend, however, as is shown by the virtual monopoly the electrical methods have enjoyed and are still enjoying in this branch of geophysics. At least, there is no evidence as yet that these methods, in spite of their limitations and their little acceptance for exploration, will be supplanted soon by other techniques.

This independent course is easily explained by the fundamental differences in the field of application of these two branches of geophysics. While the aim of exploration geophysics is the location and general investigation of individual geologic structures and mineral deposits, well logging is mainly confined to a rather detailed study—in bore holes—of the sediments underlying areas selected by exploration methods or already known as oil producing. Any method reflecting fairly well formation changes can therefore be used. The electrical methods are preferred however, because of their simplicity and flexibility.

At present, well logging is almost an integral part of rotary drilling, and as long as the present drilling methods remain substantially what they have been for several decades, it is doubtful that drastic changes will be brought to the present well-logging techniques.

The selection of the best well-logging method or methods is governed by the same elements which control the choice of a method of exploration, namely, by the study of the following main factors:

1. Problems to be solved. Relative importance of these problems.
2. Methods available.
3. Adaptability of each possible method to the solution of the problems.
4. Estimation of the cost of each suitable method.
5. Selection of the methods to be used, by reaching an adequate compromise between the adaptability to the specific problems and the operating costs.

Problems of Logging

Problems to be solved by well logging can be classified under the four following headings:

1. Lithological identification of the formations traversed by the drill.
2. Detection of certain minerals, either penetrated by the bore hole or located close to it.
3. Subsurface correlations.
4. Miscellaneous drilling problems.

If the physical condition of wells to be logged is specifically considered, a

* For instance, the magnitude and polarity of the electrical potentials observed in bore holes are, to a certain extent, dependent upon the physical and chemical properties of the drilling fluid. Man-made forces, therefore, contribute to this phenomenon. Nevertheless, potential measurements in bore holes are usually classified among the first group of geophysical methods.

** For example, the resistance of the ground is usually determined by using the well known "apparent resistivity" method, whereby the ground is energized by a man-made electric current. On the other hand, this resistance can be determined also by taking advantage of the telluric currents circulating spontaneously in the ground[1].

[1] All references are listed at end of article.

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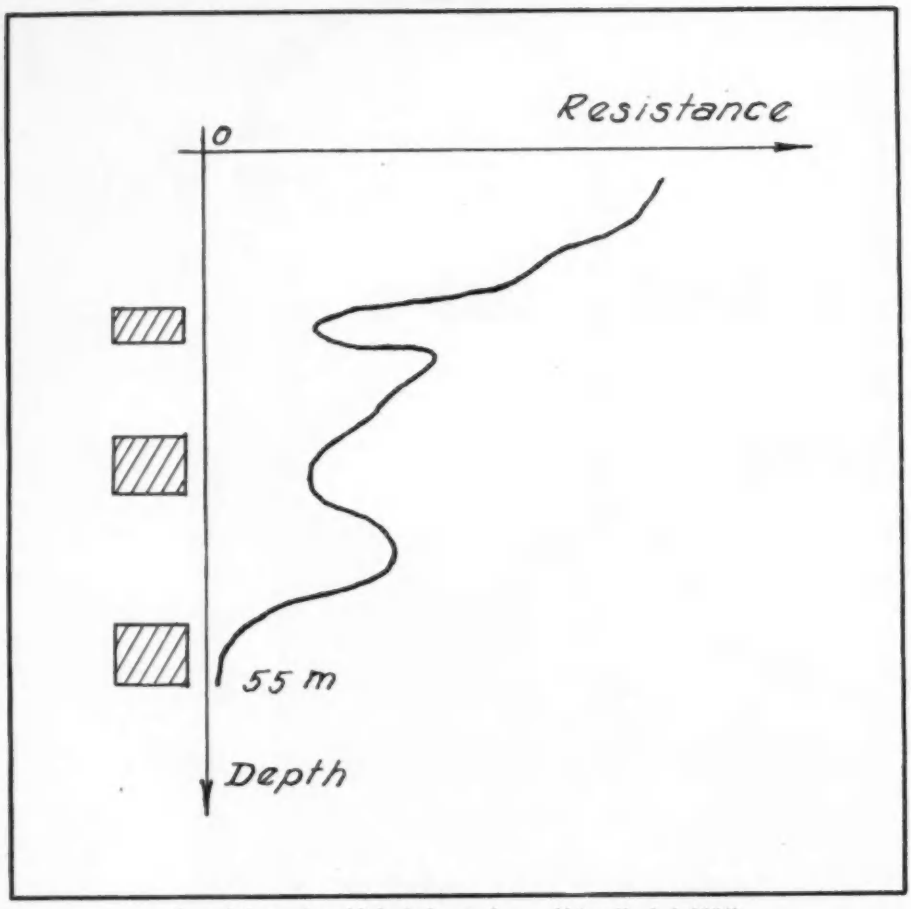

One of the early published electric logs.—(After Hunkel, 1926)

different classification is sometimes made as follows:

1. Open holes filled with water or mud.
2. Open holes filled with gas or oil.
3. Work-over jobs.
4. Cased holes.

Well-Logging Methods

Although there are many methods which could be used for logging wells, only a few of them are used extensively. In this section, we will review* briefly all the methods used, attempted or suggested, with particular reference to their adaptability to logging problems.

Certain non-geophysical methods add considerably to the information obtained by the geophysical methods. Because of the important part they play in the logging and identification of formations, they have been mentioned also in the following discussion.

Acoustic Method[2]. Physically, acoustic waves are a particular kind of seismic waves characterized by a higher frequency—usually 200 to 2000 cycles per second—than those produced in the ground by shocks or explosions. The possibility of logging wells by an acoustic method is due to the two following facts:

1. The attenuation of ground waves in a given medium is approximately proportional to the square of the frequency.
2. This attenuation changes from one formation to another.

Acoustic waves are therefore better adapted to absorption measurements than seismic waves, and they can be used for the logging of certain sedimentary formations and for the location of faults.

Velocity measurements[3] and location of contacts by sound reflection, can also be used for logging.

As far as the writer knows, the acoustic method has not been used as yet to any extent for commercial well logging.

Chemical Methods. There are two types of chemical methods used for the purpose of logging wells. The first one consists in determining the nature and quantity of certain inorganic compounds contained in cuttings or cores. The second one consists in measuring the hydrocarbon content of the formations drilled, by analyzing either formation samples or the drilling fluid.

Insoluble Residues[4]. This method consists in treating calcareous samples—cores or cuttings—with hydrochloric acid. The amount, nature and structure of the insoluble portions are, in many instances, characteristic of certain formations or individual beds and are used for correlations in certain areas, especially in the Mid-Continent. This method has the drawback of being time consuming and rather expensive. Furthermore, it yields reliable information only on scattered sections of the formations drilled.

Hydrocarbon Content of Samples[5, 6]. This process is based upon the determination—usually by chemical analysis or spectrography—of the hydrocarbon and hydrogen content of samples cut during drilling. The method does not give a continuous log of the formations traversed. It only yields information on the hydrocarbon content of certain sections.

Gas Detection in Mud[7, 8]. When gas is present in formations being drilled, part of it is carried away by the mud. After separation it can be detected at the surface with proper instruments—a hot wire, for instance. The approximate depth and thickness of gas-bearing formations penetrated by the drill can be determined by this method.

Electrical Methods. There are a relatively large number of electrical methods which can be used for logging. They can be classified into two main groups, depending upon whether or not an artificial current is impressed in the ground. The two potential methods listed below belong to the first group, whereas the other techniques belong to the second group.

Natural Potential[9]. Voltage measurements made in bore holes containing no fluid show that the electric potential of the ground varies in terms of depth, and that these fluctuations can be used to log lithologic changes of formations. Potential changes up to 100 millivolts are common. Under certain conditions the approximate nature of certain formations can also be determined. The method permits one to obtain a continuous log in a short time and with relatively simple equipment.

Secondary Potentials[10]. The magnitude of the potentials described above varies when the environment of the formations is modified. When, for instance, the nature of the drilling fluid, the pressure exerted on the formations, etc., are changed, the potentials measured in the bore hole are in general different from the natural potential. As most wells are filled with mud, potential measurements made in bore holes give generally the algebraic sum of the natural and secondary potentials. This results in the well known "potential curve" which is found on most electric logs. By adequate techniques, it is, however, sometimes possible to distinguish one kind of voltage from the other. The secondary potentials have not been investigated much and are not efficiently used at present, although it is probable that they could give information on the nature of the formations traversed by the drill not obtainable by other electrical methods.

Electrical Conductivity of Formations[11]. Sedimentary formations conduct the electric current in varying degrees. Conductivity changes from one to several hundreds are common from one bed to another. This property is used for logging formations, and sometimes for determining the nature of their fluid content. Usually, the results are translated, not in terms of electrical conductivity, but in terms of its reciprocal, the resistance offered to the passage of an electric current. Conductivity of sedimentary formations is primarily a function of their electrolyte content and texture. If we except fresh and sulphur waters, the electrolytes found in sedimentary formations are water containing mostly sodium chloride. If the salt water content of a sand is reduced—by the presence of petroleum, for instance—the bed conductivity will decrease. In certain cases, this lower conductivity can be used as an index of productivity. The conductivity methods give a continuous log with relatively simple equipment and within a very short time.

Electrical Conductivity of Drilling Mud[8]. The usual drilling mud pumped into a

* The literature referred to in this section is not necessarily the best or the most recent. In many instances, preference has been given to articles written by the originators or promoters of a method.

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rotary well is relatively fresh. When a porous bed is drilled, the mud mixes with the salty water contained in the formation, which results in an increase in the salinity of the mud. The conductivity of the mud returns will, therefore be greater than that of the ingoing fluid. By comparing the conductivity of these two legs of the mud circuit, the drilling of porous formations can be detected. Mud conductivity measurements are made at the well, and give almost immediate information on the formations drilled.

High Frequency Response[12]. The dieletric constant of sedimentary beds varies from one to several tens, and can therefore be used as an index of lithological changes. For instance, if a current of sufficiently high frequency is induced in the ground, the dielectric constant and conductivity of certain formations will react on the energizing circuit in a characteristic manner.

This method, although probably the earliest electrical method designed for logging wells, is not used to any great extent at present, probably because of its complexity.

Instead of observing the ground reactions on the energizing circuit, it is possible to observe them on a pick-up circuit located at a certain distance from the source. It has been found[13], for instance, that the magnitude of radio signals are related to the electric properties of the ground, i. e., to its lithological character. Formations can be logged by this method, but the technique is rather involved and probably out of proportion with the results to be expected.

Polarization. When an electric current is sent into the ground, the formations are subjected to electric stresses—designated here by the broad name of "polarization". These stresses gradually disappear when the energizing influence is suppressed. Their observation, the rate of their decay, or the detection of secondary effects, can yield information on the electrical properties of the ground. Although this method can be used for the identification of certain formations, it has not been developed yet to a point where it could be used in bore holes.

Electrical Transient[14]. When a varying voltage is impressed on the ground, the rate of build-up of the resulting current varies according to certain electrical properties of the formations. This method, although used for surface exploration, has not been applied yet to commercial logging, apparently because the measurements are rather complicated.

Gravitational Method. This method which is based on the measurement of changes of density could theoretically be used for logging formations and for location of certain beds (gas sands, for example). Density changes from one sedimentary formation to another are rather small: usually from 1 to 4. Although gravimetry is a fundamental method of surface exploration, it has not been used as yet—probably not even attempted—for logging wells. The reason therefor is the lack of sensitivity of the method, unless considerable accuracy is attained. Because of the particular construction and use of the present gravitational instruments such accuracy is incompatible with measurements in bore holes.

Intake Method[15]. Permeable formations can be located in situ by pumping water or air into a packed off section of the well. By measuring either the input of fluid under a known pressure or the rate of pressure drop, relative permeability measurements can be carried out. This method has not found many applications in rotary wells because of the presence of the mud cake on the face of the sands. It is used occasionally when very permeable streaks in certain sand sections have to be located (water-flooding projects, acidizing problems, etc.).

Magnetic Methods. There are two main types of magnetic well logging methods. One of them is based on the measurement of the natural magnetism of rocks; the other on the measurement of their remanent magnetism.

Susceptibility Measurements. Most rocks, although non-magnetic by themselves, become magnetized when placed in a magnetic field. The terrestrial magnetic field having a fairly high intensity everywhere in the ground, it follows that practically every type of formation will exhibit a certain magnetism, the intensity of which will depend upon its nature. This will, of course, be superimposed to any magnetism the formations may have of their own. This total natural magnetism is called "susceptibility". In sedimentary formations, it is usually very small but variable from rock to rock. Extremely delicate instruments would be necessary to measure it in bore holes with enough accuracy to give data readily correlatable with formation changes. The method has probably never been used, except possibly for the location of magnetized deposits situated close to bore.

Retentivity Measurements[16]. Part of the magnetism acquired by substances when subjected to a magnetic field, will be retained temporarily after the energizing field is removed. This property of securing residual magnetism is called "retentivity" and it varies from rock to rock within fair limits. If relatively intense fields are used — hundred of times that of the earth—a measurable remanent magnetism can be built up in most sedimentary rocks and can therefore be used for logging. The method is better adaptable to field measurements than the susceptibility method because of the larger intensity of magnetism involved.

If the artificial field is impressed upon the formations for only a short duration, the remanent magnetism disappears quickly, but at a rate which varies with the nature of the formations. This property can be used also for logging.

Retentivity measurements have been made successfully in bore holes for the purpose of securing correlative data.

Mechanical Methods. There are several types of mechanical methods used for logging.

Hole Calipering[17]. Certain rocks being brittle are eroded by the continuous circulation of the drilling fluid. Others, like salt, are dissolved. This results in local changes in the diameter of the hole which are directly related to the nature of the formations. Continuous measurements of the average size of the hole in terms of depth will therefore give a log related to lithology.

Drilling Rate[18]. As the rate of drilling varies appreciably with the hardness and compactness of rocks, a plot of the footage drilled, in terms of time, will reflect changes of formations. Although this method yields a rather crude log, it offers a good indication of formation changes and it has the great advantage of giving at an extremely low cost a continuous log while drilling proceeds.

Drilling Reaction. Observation of the reaction of the rocks on the drilling equipment gives information on the nature or changes of formations being drilled. Vibrations, torque, etc., are intuitively translated into petrographic terms by experienced drillers, and a crude, but sometimes quite useful log can be established while drilling proceeds. Actual measurement of these reactions[19] might yield useful lithological information.

Optical Methods. There are several types of optical methods.

Optical Examination of Formations. It has been proposed to log formations by lowering a camera in bore holes and either making pictures of them at regular intervals, or measuring the amount of light reflected by them from a light source. This method can probably be used in wells where the bore fluid is either clear water (water flooding areas) or air (cable-tool wells). In rotary drilling, the mud is so opaque that the process is probably not applicable unless perhaps the window of the optical instrument is held against the walls of the bore hole. This, unfortunately, is not always possible because of the variable diameter of the bore. As far as the writer knows, the method has not been successfully developed as yet.

Visual Examination of Samples. The earliest well-logging method consists in plotting in terms of depth the description of the formation from a visual study of cores or cuttings. It is well known and has been listed here only for the sake of completeness. It gives excellent lithological information on the intervals from which cores or cuttings are recovered. This method is expensive if conventional cores are desired. It is not always dependable because the recovery of samples is often uncertain. Furthermore, depth data is not always reliable. The presence of oil can usually be detected by its fluorescence when the samples are examined under ultra-violet light.

Fluorescence of Formations[20]. Crude oil being fluorescent, can be detected in situ by subjecting the walls of the hole to appropriate radiations—usually ultra-violet light—and measuring the amount of fluorescence by adequate instruments perhaps photoelectric means. The fluorescence method has the same limitations as those of the first optical method mentioned above. To these shortcomings must be added the difficulty brought by the mud cake and the contamination of sands by mud infiltration. It is therefore doubtful that the method can yield consistently good results unless the bore fluid is translucent, and the face of the permeable beds is scraped clean.

Fluorescence of Drilling Fluid[7]. When oil-bearing formations are being drilled, some oil is carried to the surface by the drilling fluid and can be detected by inspecting the mud returns under ultra-violet light. This method is particularly useful in wildcats, especially in areas where the other methods of logging fail to give reliable information on the fluid content—lime sections for instance.

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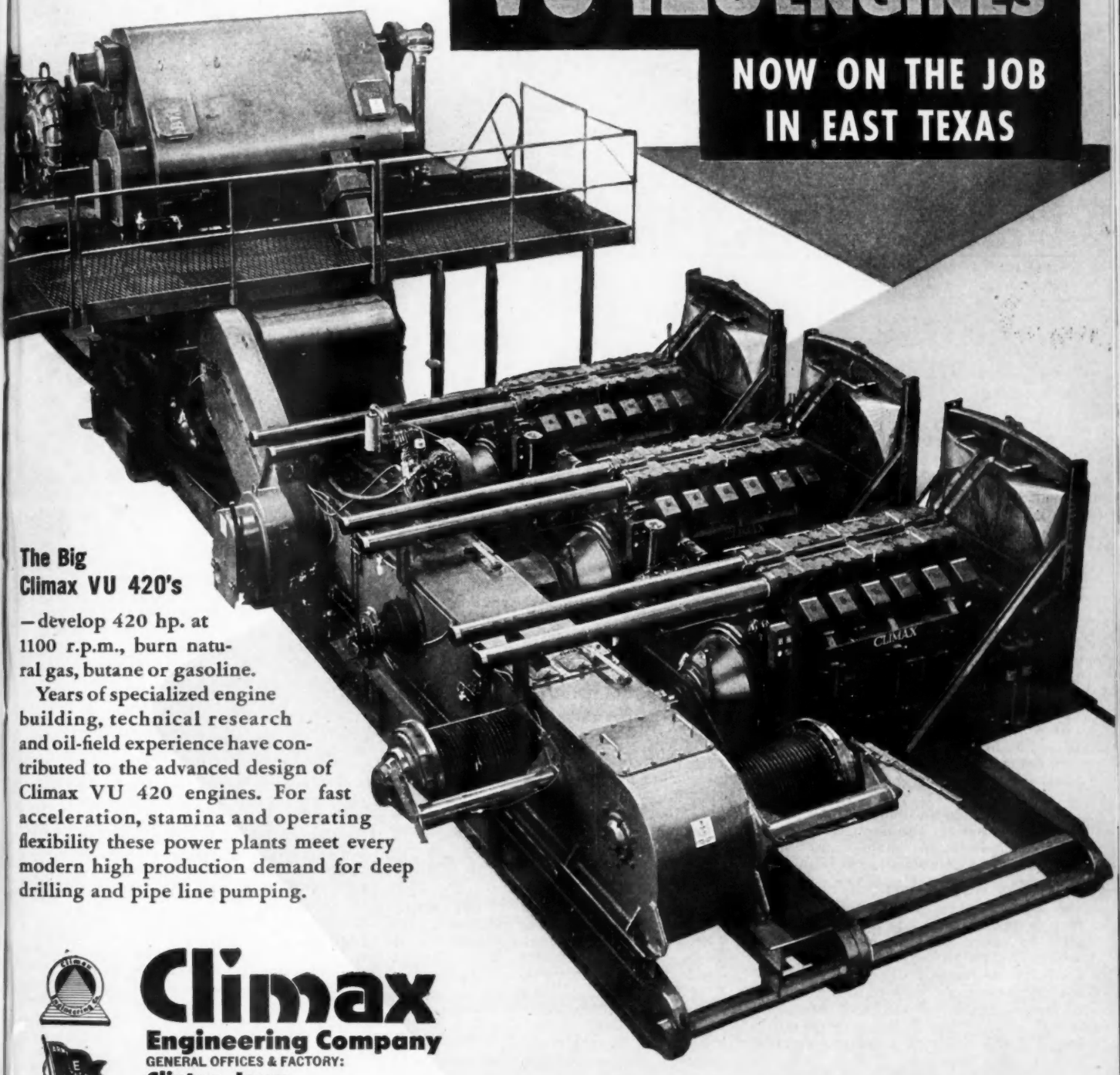

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TABLE 1

Physical Data on Various Substances

PROPERTY	Potential MV	Resistivity OHM-M	Dielectric Constant	Density	Magnetic Susceptibility x10⁶ CGS	Remanent Magnetism x 10³	Radioactivity 10⁻¹² g./ rad. equ/g	Velocity of Seismic Waves ft/sec x 10⁻³	Thermal Conductivity x 10³ CGS
SUBSTANCE									
Elements:									
Aluminum		$3.2x10^{-8}$		2.7	0.65				500
Carbon			5	2.25	—2.0				10
Copper		$1.7x10^{-8}$		8.8	—0.09				1000
Iron		$9 \text{ to } 15x10^{-8}$		7.9	80,000				160
Lead		$21x10^{-8}$		11	—0.1				83
Silver		$1.6x10^{-8}$		10.5	—0.2				1000
Minerals:									
Calcite		10^{7}	8 to 9	2.6 to 2.8	—0.6 to —1.1				10
Graphite		$10^{-4} \text{ to } 10^{-1}$		2.1 to 2.3	—8				12
Magnetite		$10^{-2} \text{ to } 10^{-1}$		5.0 to 5.4	30,000 to 100,000	60,000			30
Pyrite		$10^{-3} \text{ to } 10^{-6}$		4.9 to 5.2	4.5 to 100				25 to 40
Quartz		10^{10}	4 to 15	2.5 to 2.7	—1.1		2 to 10		6 to 30
Non Sedimentary Rocks:									
Basalt		10^{5}	10 to 12	2.7 to 3.2	500 to 10,000	150 to 600	1 to 2		5 to 7
Gneiss		10^{4}	12 to 14	2.6 to 3.0	10 to 2000		2 to 4	10 to 24	5 to 6
Granite		10^{6}	7 to 9	2.5 to 3.0	8 to 2000	0.5 to 4	2 to 8	13 to 19	4 to 8
Porphyry		10^{4}	9 to 12	2.6 to 3.0	40 to 50		1 to 3		5 to 8
Sedimentary Rocks:									
Anhydrite	0 to —5	10^{8}	6 to 8	2.6 to 3.0	—1 to —10	6 to 15	0.1 to 0.5	11 to 15	
Chalk	—10 to —50	2 to 20		1.8 to 2.8				6 to 13	2 to 3
Clay	—10 to +10	2 to 15	2 to 5	1.8 to 2.6	25 to 32	2 to 6	1 to 2	3 to 9	2 to 3
Coal and Lignite	—20 to +20	$10^{2} \text{ to } 10^{6}$		1.2 to 1.8	1.5 to 2		0.5 to 2		0.5 to 1
Dolomite	—10 to —150	2 to 10^{3}	6 to 8	2.4 to 2.9	2 to 14		1 to 8		1 to 2
Gypsum	0 to —10	10^{3}	5 to 9	2.2 to 2.6	—1 to —10			10 to 12	2 to 4
Limestone	0 to —100	40 to 10^{5}	8 to 11	2.1 to 2.8	3 to 4		1 to 7	3 to 20	3 to 5
Rock Salt	—20 to +20	10^{8}	5.5 to 6.5	2.1 to 2.3	—0.5 to —1.3		1.6 to 2	14 to 25	7 to 10
Sand (oil or gas)	—10 to —180	1 to 10^{3}	3 to 8	1.9 to 2.3	3 to 4.5	1 to 2	1 to 5		2 to 6
Sand (water)	+20 to —200	$10^{-1} \text{ to } 10^{3}$		2.1 to 2.5	3.5 to 5		1 to 5	3 to 8	2 to 6
Sandstone (oil or gas)	—5 to —150	20 to 10^{5}	8 to 12	2.1 to 2.5	4 to 5.5	1 to 4	1 to 12		2 to 7
Sandstone (water)	—5 to —160	10 to 10^{4}		2.2 to 2.6	5 to 16		1 to 12	6 to 14	2 to 8
Shale	±20	1 to 100	2 to 5	1.9 to 2.4	42 to 46	2 to 8	2 to 20	9 to 14	2 to 4
Fluids:									
Air		10^{8}	1	0.0013	24			1.1	0.05
Natural Gas		10^{8}	1						0.2
Crude Oil		10^{4}	2 to 2.5	0.6 to 0.95	—0.8		0.01 to 0.04		0.3
Water (fresh)		10 to 200	80	1.0	—0.7			4.7 to 4.8	1.4
Water (sea)		0.15 to 0.3		1.02 to 1.05	—0.7			4.8 to 5	1.5
Water (connate)		0.1 to 0.8		1.01 to 1.07	—0.7				1.5
Water (sulphur)		10 to 50		1.01	—0.7				
REMARKS:	Total potential observed in bore holes. Average potential in shales taken as zero.	Very large values are approximate.		The highest values in a given range are usually obtained for oldest or deepest rocks.	Varies with field strength.	Varies with operating conditions.		The highest values in a given range are usually obtained for oldest or deepest rocks.	

Radioactive Methods. Once a hole is cased, it is no longer possible to log it by any of the methods listed above. Then, the only way of having a good record of the formations traversed, is to log the well by a radioactive method.

Natural Radioactivity[21]. This method is based on the following experimental facts:

1. All substances contain various amount of radioactive material—from 0.1 to $20x10^{-12}$ gram of radium equivalent per gram or rock.

2. A significant relationship exists between these amounts and the lithology of sedimentary rocks.

3. All radioactive materials emit radiations which can penetrate several inches of steel.

By measuring the magnitude of these radiations, sands, sandstones, etc., are differentiated from shales and other rocks and a continuous log is obtained.

Artificial Radioactivity[22]. By subjecting the formations—even through casing—to a bombardment of neutrons, it is possible to cause them to emit radiations which can be picked up in the hole by adequate instruments. The magnitude of the phenomenon is related to the amount of free or combined hydrogen contained in the formations. The corresponding log is quite different from the natural radioactivity record.

Although the radioactive methods find their largest field of application in cased holes, they can of course, be used also in open holes, whether they contain any fluid or not.

Seismic Method. The velocity of seismic waves may vary within relatively large limits, and it has been proposed[23] to log formations by measuring this velocity in bore holes, whether cased or not. The method does not seem to have been developed yet to a point where information not obtainable by more simple methods could be had.

Thermal Methods. Temperature measurements in bore holes can be divided into two classes, depending upon the thermal state of the well. If there is perfect temperature equilibrium between the fluid in the hole and the formations outside, the measurements give the temperature of the formations (gradient method). If the equilibrium is not reached, the measurements give the temperature of the bore fluid (evolution method).

Gradient Method. The temperature gradient in the ground is dependent primarily upon the thermal conductivity of rocks and the tectonics. The thermal conductivity of sedimentary rocks varies from 1 to $6x10^{-3}$ CGS units. Temperature gradient measurements made in a bore hole which is in thermal equilibrium will therefore reflect lithologic changes if the accuracy of measurement is sufficient. It is rare, however, that reasonable thermal equilibrium is reached at the time measurements are made, a fact which decreases the accuracy of the method. Because of this limitation the gradient method has found little application to well logging.

Evolution Method[24]. During drilling, the temperature of the drilling fluid in a bore hole is different from that of the formations. If circulation is discontinued there will be, for several hours, an exchange of heat between formations and mud. In the sections where the hole is enlarged, as in shales, the volume of mud is relatively large, and changes in mud temperature will be slower than when the diameter is close to bit size—sands for instance. Temperature measurements made under this condition will reveal lithologic changes. Experience has shown that the presence of a casing, cemented or not, does not interfere appreciably with the operation of the method. There are nevertheless many factors which make this technique somewhat unreliable and it is therefore seldom used for logging. A more important application of the process is the location of oil or gas bearing formations in open holes when the expansion of these fluids into the bore hole is large enough to cause local drops in temperature[25].

Summary

The above discussion on the well logging methods has been summarized in Tables 1 and 2.

Table 1 gives some physical data on

One purpose • • •

the IMPROVEMENT of Metals

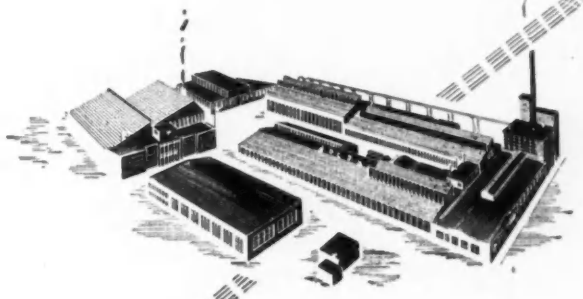

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TABLE 2
Well Logging Methods

METHOD	TYPE	Properties Investigated	Formation Identification			Detection of Oil			Detection of Gas			Correlations				Adaptability to			Present Commercial Use			
			B	F	G	B	F	G	B	F	G	B	F	G	VG	OH	CH	S	N	L	M	C
Acoustic	Sound intensity	Cohesion	X			X			X					X		X	X		X			
	Sound velocity	Elasticity—Density	X			X			X					X		X	X		X			
Chemical	Insoluble residues of samples	Mineral content		X		X			X				X					X		X		
	Hydrocarbon content of samples	Hydrocarbon content	X					X			X	X						X		X		
	Gas detection in mud	Gas content	X			X					X	X						X			X	
Electric	Natural potential	Electrochemical properties (?)		X		X			X						X	X						X
	Secondary potential	(?)		X		X			X					X		X				X		
	Formation conductivity	Salt water content—Texture	X				X			X					X	X						X
	Mud conductivity	Salt content	X			X			X				X					X			X	
	High frequency response	Dielectric constant—Conductivity	X			X			X					X		X				X		
	Polarization	Electrolytic properties—Dielectric constant	?			?			?				?			X			X			
	Transients	Miscellaneous electric properties	X			X			X					X		X			X			
Gravitational	Gravity	Density	X			X			X				X			X	X		X			
Intake	Water or gas intake	Permeability		X		X			X				X			X				X		
Magnetic	Susceptibility	Effect of terrestrial field	X			X			X					X		X			X			
	Retentivity	Effect of artificial field	X			X			X						X	X				X		
	Retentivity decay	Coercive force	?			X			X					X		X			X			
Mechanical	Hole calipering	Brittleness—Solubility		X		X			X						X	X					X	
	Drilling rate	Hardness—Compactness		X		X			X					X		X					X	
	Drilling reaction	Hardness—Compactness—Texture		X		X			X				X			X				X		
Optical	Examination of formations	Color—Texture	X			X			X				X			X			X			
	Examination of samples	Color—Texture—Content			X			X		X				X				X				X
	Fluorescence of formations	Oil content	X			X			X			X				X			X			
	Fluorescence of mud	Oil content	X					X	X			X						X			X	
Radioactive	Natural radioactivity	Radioactive substance content		X		X			X						X	X	X				X	
	Artificial radioactivity	Hydrogen content		X		X			X						X	X	X				X	
Seismic	Wave velocity	Elasticity—Density	X			X			X					X		X	X		X			
Thermal	Gradient	Thermal conductivity	X			X			X				X			X	X		X			
	Thermal evolution	Brittleness—Solubility—Gas expansion	X				X			X			X			X	?		X			

B—bad F—fair G—good VG—very good OH—open holes CH—cased holes S—samples or mud N—never or almost never L—little M—much C—considerable.

rocks when these can be expressed in figures. The same information has been given also for a few elements, minerals and fluids. Comparison of data given for sedimentary rocks to those obtained for other types of material will reveal the large physical differences between the formations usually found in bore holes and the other substances constituting the earth's crust.

Table 2 shows the applicability of each method to the solution of the most important problems of logging.

Selection of Logging Methods

In the oil industry, most problems to be solved by well logging can be boiled down to one question: "Where is the oil?" If one or several wells are available, the log must tell whether the section carries oil, and where this oil is. This problem is that of lithological identification and determination of the fluid content of formations. Whether there is oil, or not, the log must also give geological information so that the location of other wells can be determined. This second problem is that of correlation.

Lithological Identification. A glance at Table 2 reveals that an excellent lithological identification of the formations is possible only when samples of the formations are available. In rotary drilling, this would result in continuous coring because no really reliable sampling technique has been developed as yet. Continuous coring, unfortunately, is not only expensive, but it is often unreliable in unconsolidated formations.

Fortunately, to solve our problem fairly well an exact lithological identification of the beds drilled, although desirable, is not essential. Coring may therefore be used only occasionally: when permeability data are also desired, for instance.

Technique in Open Holes

Indirect identification of many permeable beds, on the other hand, is possible with quite a few methods. Among them, those giving a continuous log at a reasonable cost are at present:

Potential
Radioactivity
Hole Calipering

Detection of Oil and Gas. Table 2 shows that a direct detection of oil or gas is possible only if samples of mud returns or of rocks are available.

The available methods for direct oil and gas detection are:

Coring (conventional or side wall)
Hydrocarbon analysis of samples
Mud testing

These methods are slow and expensive if long sections of the well must be investigated. Fortunately, there is an indirect approach which gives fairly good results in many cases, when used in conjunction with other methods. This is the measurement of the formation conductivity, usually called the "resistance method", or "apparent resistivity method". The technique is simple, rapid, relatively inexpensive and gives a continuous log. No other method for indirectly detecting petroleum has been developed as yet.

Correlations. Many methods give good correlations. As a matter of fact, most any method which measures a physical property, can theoretically be used for correlations. However, only those methods giving continuous logs can be considered here. From them it is also necessary to eliminate the processes which, at present, are complicated, expensive or slow. This leaves only six practical methods, namely:

Potential
Conductivity of formations
Retentivity
Hole calipering
Natural radioactivity
Artificial radioactivity

Among them we recognize those mentioned before for their ability to identify formations.

Miscellaneous Drilling Problems. Only one of these problems will be considered in this article: the location of the casing shoe. This is solved well by

Formation conductivity
Retentivity or Susceptibility
Artificial radioactivity

Selection of a Standard Logging Technique in Open Holes. Except continuous coring—with excellent recovery—no method is able to solve by itself all the problems of logging. On the other hand, a combination of methods can do so reasonably well. If it is desired to detect hydrocarbons at a reasonable price—and this is generally the case—the foregoing sections show that there is only one method available at present: the measurement of the formation conductivity. This method, if used alone, would be imperfect because the range of conductivity values for oil or gas bearing formations is almost the same as that of all the sedimentary formations of the same geologic section. Practically any conductivity value measured in a bore hole may correspond to a petroleum-bearing formation. Part of the doubt can be lifted, however, by supplementing the conductivity log with another log, allowing lithological identification. Experience has shown that any of the three methods listed previously—

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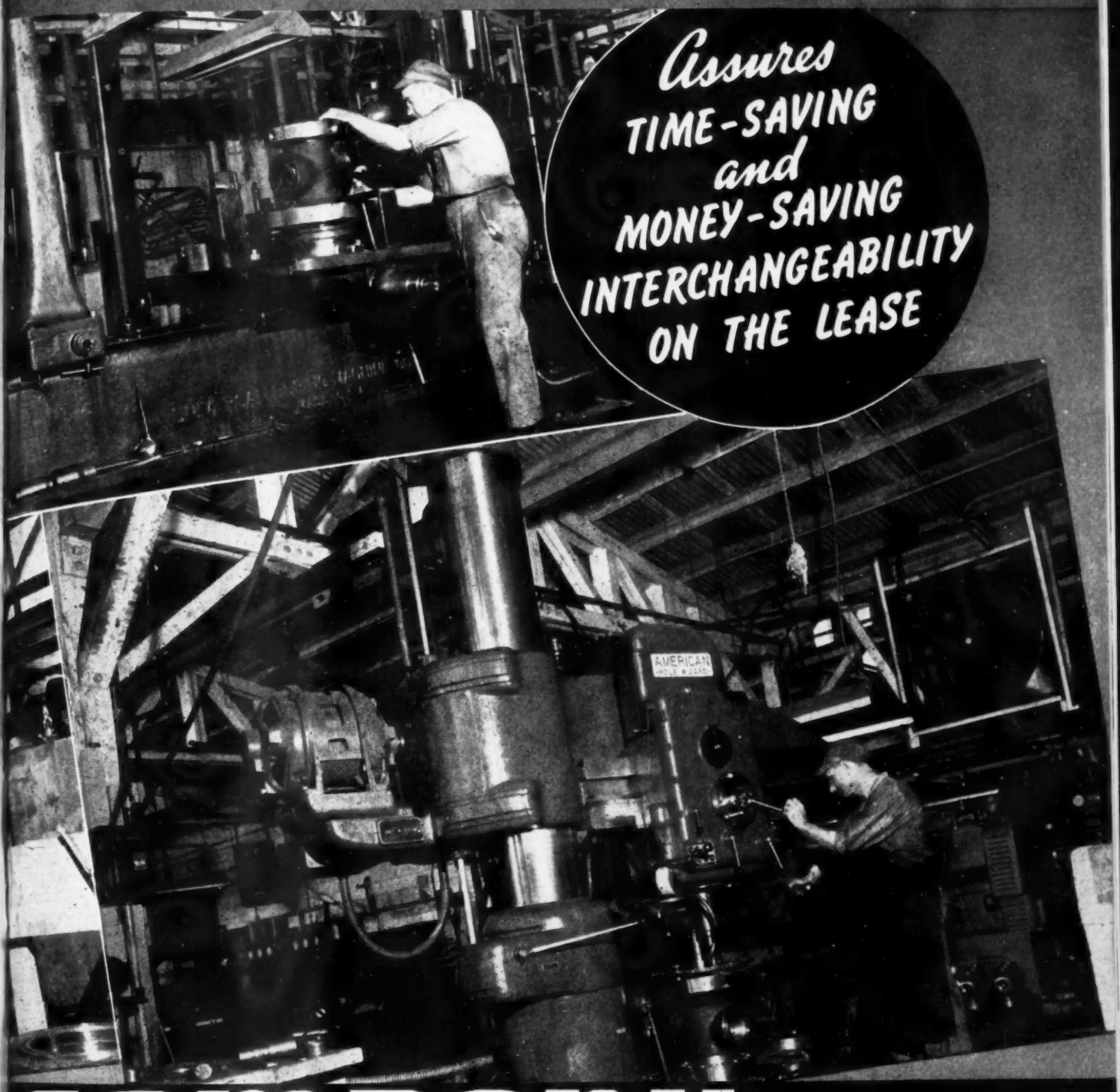

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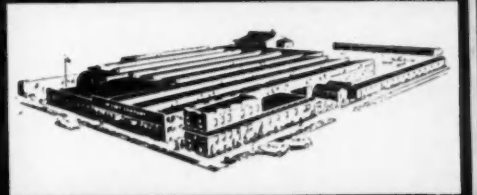

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potential, radioactivity, hole calipering—is usually acceptable. The simplest technique, and that most easily adaptable to simultaneous conductivity measurements, is however, the potential method. It should not be forgotten, however, that this combination—apparent resistivity and potential—is made only for the sake of technical convenience. As good—if not better—results would be obtained in certain cases if hole size or radioactivity measurements would be carried out instead of the potential measurements.

Any of those simultaneous techniques has also the advantage of solving satisfactorily the correlation problems, and can therefore be selected as a standard well logging technique in open holes for the time being.

In order to increase the safety of hydrocarbon detection when one of these techniques is employed, intermittent use of a direct method of detection is often used—side wall coring, mud logging, et cetera. The overall efficiency is then considerably increased without leading to prohibitive costs.

Special Problems. If the preceding analysis had been made several decades ago, it would certainly have been of extreme constructive value. Today, these aposteriori conclusions offer considerably less interest, and they have been drawn mainly to justify the use of our present logging techniques. Other techniques—thought by their originators to possess high logging efficiency—are often advocated. It is doubtful, however, that they would give superior results, except possibly in a few specific cases. In these cases, it is much simpler to carry out an additional measurement of the desired property, rather than change the regular procedure.

Future of Electrical Well Logging

The art of well logging was rather crude at the beginning of the century when the driller made his own log from the cuttings and from his intuitive interpretation of the bit reactions. However, as the importance of a good record of the formations drilled became more and more apparent, the problem of logging was almost entirely assigned to a specialist, the geologist. His efforts resulted in a much more efficient use of the old methods and in the development of new ones. Scientific techniques were then gradually introduced, the most important of which are those giving a continuous log of the formations penetrated by the drill. Electric logging is ranking first among this class of methods.

Although electrical measurement in bore holes have been reported as early as 1913, results presented in the form of an electric log have not been found in the literature before 1926. The accompanying figure is a reproduction of one of the early published electric logs. It is a single point resistance measurement made in a bore hole at the bottom of a shaft.[26] Many present electric logs still include this type of measurement among their various curves.

Although electric logging is still imperfect, and notwithstanding the fact that its limitations have been known for a decade, few improvements have been brought to it during the last years. Quite a few potentially productive formations are probably still unnoticed on the electric log. The introduction of more resistance curves during the last several years saved in many cases the expense of unnecessary tests, but it did not help locating certain oil or gas bearing sands which give an extremely small response on both sides of the electric log.

One of the reasons for this lack of progress might be the still existing illusion with many individuals that potential measurements yield a porosity or permeability curve, and that resistance measurements give a fluid curve. Such an interpretation is unfortunately often erroneous, and it should be remembered that a lack of reaction on these curves is only negative information. This misunderstanding, and many others, can be partly ascribed to the fact that the physical angle of electric logging is not always very well understood by the users of the logs. Progress in the interpretation of electric logs, and therefore, progress in well logging in general, will be rather slow so long as the physics and the geology are separated as widely as they are today. In this respect, the situation is not different from that of exploration geophysics.

The articles which will follow this discussion have been written with the particular purpose of remedying somewhat this situation by explaining to the geologist and the petroleum engineer the physical basis of electric logs. A few limitations of the present logging methods will be explained. On the other hand, many other limitations will be mentioned, but no reasonable explanation will be offered for the unsatisfactory result given by the logs. This state of affairs is probably due to the fact that certain electrical properties of the rocks are still little understood. This is particularly the case of the electrical potential observed in bore holes. Although a few scattered attempts have been made to analyze the origin of these potentials,[27, 9] no really complete explanation has been given as yet. As long as no better understanding of this phenomena and its fluctuations is possible, it will be extremely difficult, if not impossible, to take full advantage of the potential log, either in its present form or in a modified version.

Improvement Possible

Research on the electrical properties of rocks might lead not only to better methods of interpretation of the present logs, but also to novel techniques which could offer a better solution of the problems of logging. The most important of these problems is probably that of a positive detection of permeability, whether the porous beds carry water or petroleum. If this information were available, the danger of passing up oil sands would be considerably minimized. Sands, sandstones and lime have physical properties so different from those of non-porous beds that it is difficult to believe that their detection is not possible by physical methods. The answer might not be the making of one single measurement, but possibly several of them which would be interpreted simultaneously. A long step forward for the solution of this problem has been made recently with the introduction of the neutron log (artificial radioactivity), interpreted simultaneously with a gamma ray log (natural radioactivity). There is good evidence that the simultaneous interpretation of these two logs can sometimes locate porous beds where other methods failed.[28]

If a really reliable method of identifying the fluid content could be developed also, well logging, of course, would almost achieve perfection. The fairly good knowledge we have now of the resistance of the ground leads us to believe that this technique will never be completely successful for the determination of the fluid content of porous formations, even when used in conjunction with permeability curves. There will always be cases where the interpretation will be doubtful or erroneous. The introduction of more resistance curves can not solve the problem. In fact, the shortcoming lies in the specific resistance of the formations themselves, and not in how the resistance measurement is carried out. A satisfactory answer to the problem of the fluid content seems therefore to be the measurement of a different property. Offhand, nuclear physics seems to offer the best possibilities for the solution of this problem.

It is the writer's opinion that electric logging is still in an early stage of development. It is to be hoped that as much research effort will be made in this field during the next years as will be done in the other branches of the oil industry.

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Possibilities for Oil And Gas in Tennessee

Cumberland Plateau and Highland Rim regarded favorable areas in state that has long record for sporadic exploration

By KENDALL E. BORN
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THE presence of oil seeps in Tennessee along the eastern Highland Rim was noted more than 100 years ago by Gerard Troost, the first State Geologist of Tennessee. The first commercial oil was found along Spring Creek (38)* in southern Overton County in 1866, seven years after Drake's discovery in Pennsylvania. Since that time the history of oil and gas developments in Tennessee has been essentially one of sporadic drilling with the discovery of small fields, many of which have been short-lived. Most of the production has been relatively shallow, the deepest being less than 2000 feet. The small initial capital required for shallow testing has resulted in numerous wildcat drilling operations preceded by little or no geologic work. This has naturally resulted in an unusually high percentage of dry and near-dry holes. In the past there have been no laws in the state which required the filing of drilling permits, well records, or production figures. An attempt has been made to tabulate in the accompanying chart the more pertinent data for Tennessee production.

The following is a brief outline of oil and gas developments in the State according to physiographic divisions:

East Tennessee

The strata of East Tennessee, including the Great Smokies and the Valley and Ridge regions, are of pre-Cambrian, Cambrian, Ordovician, and Silurian ages which are generally so intensely folded and faulted as to preclude the chance of finding oil and gas in commercial quantities. Despite this fact ten wells have been drilled in East Tennessee, only one of which found encouraging shows of oil.

Cumberland Plateau, a tableland with an average elevation of 2000 feet, is capped with sandstones, shales, and coals of Pennsylvanian age, which reach a maximum thickness of more than 3000 feet in the northern part of the area. Limestones, shales, and sandstones of upper Mississippian (Chester) age crop out along the western escarpment of the plateau. Structurally, the major part of the plateau is a monocline dipping gently to the east and southeast toward the highly folded and faulted Appalachian structural province.

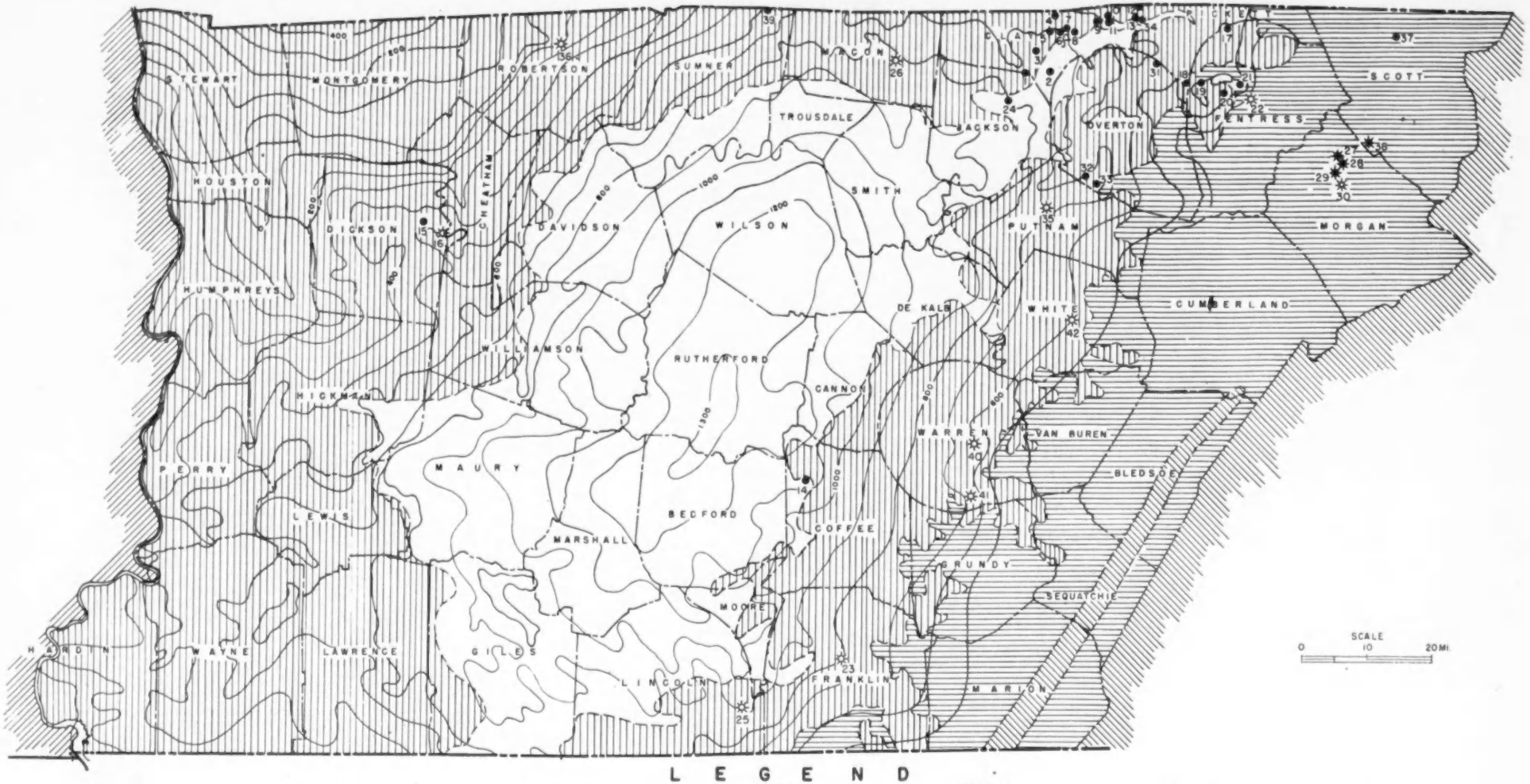
Although several widely-separated oil tests have been drilled in the southern part of Cumberland Plateau, most of the activity has been in the northern part, especially in Morgan and Scott Counties. In 1915, oil was found in limestones of Chester age, approximately 5 miles northwest of Oneida in Scott County (37). This production, found at approximately 1000 feet, was

* Numbers in parentheses refer to oil pool locations appearing on map on page 55.

RECENT growing interest in the oil possibilities of the area comprising the south flank of the Cincinnati arch makes a review of oil and gas developments in Tennessee pertinent. All information in the article is available at nominal cost from the Tennessee Geological Survey Division, printed on a single wall-sized sheet, 25 x 21 inches.

		GROUP	SECTION	THICK	PRODUCING HORIZONS	LITHOLOGY	AREAL DISTRIBUTION
PENNSYLVANIAN	POTTSVILLE			1000-2700'		Massive cliff-forming sandstones; gray and yellow sandy shales (Anderson and Scott). Gray argillaceous and sandy shales and less massive sandstone (Jellico and Briceville)	Restricted to the northeastern part of Cumberland Plateau
		LEE		1000-1500'		Alternating beds of gray and yellow shales and sandstones with some coals. Divided into nine formations	Surface rocks over most of Cumberland Plateau well developed in the southern part of the Plateau
MISSISSIPPIAN	UPPER	CHESTER		350-750'	● 37	Variegated shales and impure limestones (Pennington), gray thick-bedded limestone (Glen Dean), sandstone and shale (Hardinsburg), reddish shales and limestone (Golconda), brown sandstone and shale (Cypress), gray oolitic and crystalline limestone (Gasper)	Along the western escarpment of Cumberland Plateau and on outliers west of the Plateau
	MIDDLE	MERAMEC		250-450'	● 38 ☼ 30 ● 38	Gray oolitic and crystalline limestone (Ste Genevieve); crystalline and cherty limestone (St Louis); pure to sandy limestone with some shale (Warsaw)	Surface rocks over large areas of the western northern and eastern Highland Rim
	LOWER	OSAGE		150-300'	☼ 41 ☼ 30 ● 27,28,29 ● 17,32	Dark cherty and siliceous limestone with much shale and some crinoidal limestone (Ft. Payne)	Surface rocks of the Highland Rim surrounding the Central Basin
		KINDERHOOK		0-75		Dark fissile carbonaceous shale (Chattanooga)	Base of the Highland Rim escarpment
DEV.	MID.	ONONDAGA		0-35	☼ 16,36	Pure massive crystalline limestone with some sandstone (Pegram)	Isolated exposures along western edge of the Central Basin
SILURIAN	NIAGARAN	LOCKPORT		50-150'	● 39 ● 15	Gray crystalline limestone (Decatur), shale with some limestone (Brownsport), gray and red shaly limestone (Dixon) gray crystalline limestone (Lego), calcareous shale (Waldron), pinkish crystalline limestone (Laurel)	Along western edge of the Central Basin from Macon to Wayne counties
		CLINTON		10-30		Gray and red argillaceous limestone (Osgood)	Along western edge of the Central Basin
	MED.	ALBION		10-30		Gray crystalline cherty limestone (Brassfield)	Along western edge of the Central Basin
ORDOVICIAN	CINN	RICHMOND		0-90	☼ 16	Pinkish crystalline limestone with variegated shale (Fernvale), blue shaly limestone (Arnheim)	Along western and northern edges of Central Basin
		MAYSVILLE		50-100	☼ 40,16	Bluish gray argillaceous limestone (Leipers)	Widespread around the outer Central Basin
	MOHAWKIAN	TRENTON		400-500'	● 18,19 ☼ 22,41 ● 5,8,15,18,19,21,33 ☼ 16,23,26,35,40,41 ● 5,10 ● 2,6,8,10,13,14,20,34 ☼ 22,25	Gray limestone with shale (Catheys), bluish-gray to dove limestone (Cannon); blue-gray granular phosphatic limestone (Bigby); thin-bedded blue-gray siliceous limestone and shale (Hermitage)	Surface rocks over most of the outer part of the Central Basin
		BLACK RIVER		40-100'	PENCIL CAVE ● 4,13,24,34 ☼ 25,40	Thin-bedded limestone with bentonite (PENCIL CAVE) at base (Upper Carters), gray heavy-bedded limestone (Lower Carters)	Widely distributed around the inner part of the Central Basin
	CHAZYAN	STONES RIVER		400-650'	● 1,2,3,4,5,6,7,10,11,13,34 ☼ 25 ● 1,3,6,9,10,12,24 ● 2,6,8,10	Thin-bedded gray limestone (Lebanon), gray massive limestone (Ridley), thin-bedded gray shaly limestone (Pierce), gray massive limestone (Murfreesboro)	Surface rocks over most of the inner part of the Central Basin
		BUFFALO RIVER?		0-100'		Light-gray dense limestone (Zone B in the subsurface)	Not exposed in Middle Tennessee
	CANADIAN	KNOX DOLOMITE		1800+	● 5,12,17,18,24 ☼ 25	Gray to tan, sucrose to fine-grained dolomite and limestone with a considerable amount of chert and some sandy dolomite and sandstone	In Middle Tennessee exposed only in Wells Creek Basin

GENERALIZED COLUMNAR SECTION SHOWING STRATIGRAPHIC POSITION OF PRODUCING HORIZONS
Numbers refer to pool locations on map



LEGEND

WEST TENNESSEE
(Possible Province)

OIL AND GAS TESTS: 42

PRODUCTION: None

SHOWS: Reported in Upper Cretaceous and Paleozoic

DEEPEST TEST: 4202 feet, Haywood County

HIGHLAND RIM
(Favorable Province)

OIL AND GAS TESTS: 700+

PRODUCTION TO 1943: 525,500 bbl.

PAYS: Osage, Niagaran, Trenton, Black River, Stones River, Knox

DEEPEST TEST: 2665 feet; Van Buren County.

DEEPEST HORIZON TESTED: Knox dolomite

CENTRAL BASIN
(Possible Province)

OIL AND GAS TESTS: 90+

PRODUCTION TO 1943: Less than 200 bbl.

PAYS: Trenton (oil), Black River and Stones River (gas)

DEEPEST TEST: 2280 feet, Rutherford County

DEEPEST HORIZON TESTED: Knox dolomite.

CUMBERLAND PLATEAU
(Favorable Province)

OIL AND GAS TESTS: 125+

PRODUCTION TO 1943: 347,000 bbl.

PAYS: Chester-Meramec, Osage.

DEEPEST TEST: 4235 feet Grundy County

DEEPEST HORIZON TESTED: Knox dolomite (2 wells)

EAST TENNESSEE
(Unfavorable Province)

OIL AND GAS TESTS: 10

PRODUCTION: None

SHOWS: Reported in Knox dolomite

DEEPEST TEST: 4219 feet Campbell County

DEEPEST HORIZON TESTED: Cambrian.

Generalized STRUCTURAL CONTOUR MAP on top of CHATTANOOGA SHALE in CENTRAL TENNESSEE

Datum Plane: Sea Level
Contour interval: 100 feet.

OIL AND GAS

- OIL — No commercial gas
- GAS — No commercial oil
- OIL AND GAS

TENNESSEE OIL DATA

Map No.	FIELD NAME	County	Date Discovered	Status 1943	Wells Drilled	Oil Wells	Production to 1943	Gravity Be.	PRODUCING HORIZON		Structure	Deepest Horizon Tested to 1943
									Age	Character		
1	Tinsley Bottom	Clay-Jackson	1924	Aband.	42	23	31,000	40.0	Ordovician (Black River-Stones River)	Limestone	Dome	Upper Knox
2	Mill Creek	Clay	1926	Aband.	21	14	25,000	41.2	Ordovician (Black River-Stones River)	Limestone	Dome	Upper Knox
3	Arcott School	Clay	1938	Prod.	4	3	8,000	....	Ordovician (Black River-Stones River)	Limestone	Anticline	Stones River
4	Pine Branch-Kettle Creek	Clay	1927	Prod.	27	10	21,000	42.0	Ordovician (Trenton-Stones River)	Limestone	Dome	Upper Knox
5	Celina	Clay	1938	Prod.	28	12	38,000	40.2	Ordovician (Trenton-Stones River)	Limestone	Dome	Upper Knox
6	Peterman Bend	Clay	1925	Prod.	30	19	85,000	40.0	Ordovician (Black River-Stones River)	Limestone	Dome	Stones River
7	Goodpasture Bend	Clay	1937	Aband.	7	2	12,000	....	Ordovician (Black River-Stones River)	Limestone	Dome	Upper Knox
8	Fox Springs-Mitchell Creek	Clay	1926	Aband.	27	12	100,000	40.0	Ordovician (Trenton-Stones River)	Limestone	Dome	Upper Knox
9	Stillhouse Creek	Clay	1937	Prod.	8	5	13,000	41.6	Ordovician (Black River-Stones River)	Limestone	Dome	Stones River
10	Willow Grove	Clay	1923	Prod.	12	5	8,500	....	Ordovician (Trenton-Stones River)	Limestone	Dome	Stones River
11	Irona Creek	Clay	1927	Aband.	19	5	5,000	39.2	Ordovician (Trenton-Stones River)	Limestone	Dome	Stones River
12	Lillydale	Clay-Pickett	1926	Aband.	28	8	5,000	....	Ordovician (Stones River-Knox)	Limestone	Dome	Upper Knox
13	Ashburn Creek	Clay	1927	Aband.	9	4	10,000	40.8	Ordovician (Black River-Stones River)	Limestone	Dome	Upper Knox
14	Noah Fork	Coffee	1938	Aband.	6	1	200	38.3	Ordovician (Trenton)	Sh. Limestone	Dome	Upper Knox
15	Jones Creek	Dickson	1866	Aband.	15	4	1,500	39.1	Silurian; Ordovician (Trenton)	Limestone	Dome	Upper Knox
16	Forbus	Pickett-Fentress	1905	Aband.	15	6	5,000	39.0	Ordovician (Trenton-Knox)	Limestone	Anticline?	Upper Knox
17	Spurrier	Pickett-Fentress	1892	Aband.	12	6	25,000	....	Ordovician (Trenton-Knox)	Limestone	Anticline	Upper Knox
18	Riverton	Fentress	1896	Aband.	33	10	50,000	....	Ordovician (Trenton)	Limestone	Anticline	Upper Knox
19	Beaty	Fentress	1937	Prod.	8	3	7,500	40.0	Ordovician (Trenton)	Sh. Limestone	Dome	Stones River
20	Poplar Cove	Fentress	1896	Prod.	9	4	3,500	36.0	Ordovician (Trenton)	Sh. Limestone	Anticline?	Upper Knox
21	Lock Branch	Jackson	1927	Aband.	22	12	7,500	40.0	Ordovician (Stones River-Knox)	Limestone	Dome	Upper Knox
24	Boone Camp	Morgan	1924	Prod.	16	13	119,000	39.0	Mississippian (Lower)	Sh. Limestone	Terrace	Lower Miss.
27	Seabolt	Morgan	1928	Prod.	5	3	21,000	....	Mississippian (Middle)	Limestone	?	Lower Miss.
28	Coon Hollow	Morgan	1929	Prod.	6	3	50,000	41.1	Mississippian (Middle)	Limestone	?	Lower Miss.
29	Eagle Creek	Overton	1866	Prod.	8	3	2,000	....	Ordovician (Trenton)	Limestone	Anticline?	Stones River
31	Spring Creek (Upper)	Overton	1866	Aband.	30	6	35,000	40.5	Mississippian (Lower)	Limestone	?	Upper Knox
32	Spring Creek (Lower)	Overton	1926	Aband.	8	3	1,000	38.7	Ordovician (Trenton)	Limestone	?	Upper Knox
33	Jouett Creek	Pickett	1928	Aband.	9	5	15,000	39.0	Ordovician (Trenton-Stones River)	Limestone	Anticline	Stones River
34	Oneida	Scott	1915	Aband.	15	4	1,000	34.5	Mississippian (Chester)	Limestone	?	Upper Ordo.
37	Glenmary	Scott	1916	Prod.	38	19	156,000	38.0	Mississippian (Middle and Chester)	Limestone	Faulted anticline	Lower Miss.
38	Sugar Grove	Sumner	1920	Aband.	11	3	1,000	33.2	Silurian (Niagaran)	Limestone	?	Upper Ordovician

TENNESSEE GAS DATA

Map No.	FIELD NAME	County	Date Discovered	Status 1943	Wells Drilled	Gas Wells	Open Flow	Lbs. Initial Pressure	PRODUCING HORIZON		Structure	Deepest Horizon Tested to 1943
									Age	Character		
16	Harpeth Valley	Dickson	1930	Prod.	6	4	10-100M	Low	Ordovician (Trenton)	Limestone	Anticline?	Stones River
22	Jamestown	Fentress	1938	Prod.	10	6	25-500M	25-175	Ordovician (Trenton)	Sh. Limestone	Anticline?	Stones River
23	Winchester	Franklin	1921	Aband.	6	2	10-100M	Low	Ordovician (Trenton)	Limestone	?	Upper Knox
25	Smithland	Lincoln	1929	Aband.	21	14	20M-3 Mil.	20-150	Ordovician (Trenton-Knox)	Sh. Limestone	Dome	Upper Knox
26	Long Fork	Macon	1933	Prod.	5	3	500M-3 Mil.	....	Mississippian (Lower and Middle)	Limestone	Dome	Stones River
30	Sunbright	Morgan	1928	Prod.	19	9	100M-5 Mil.	....	Ordovician (Trenton)	Limestone	?	Upper Ordovician
35	Cookeville	Putnam	1928	Prod.	7	3	....	....	Ordovician (Trenton)	Limestone	?	Stones River
36	Barren Plains	Robertson	1931	Prod.	7	4	10-100M	Low	Silurian; Devonian?	Limestone	Nose?	Ordovician
40	Town Creek	Warren	1921	Aband.	3	2	50-100M	35-75	Ordovician (Trenton-Stones River)	Limestone	Anticline?	Upper Knox
41	Collins River	Warren	1928	Aband.	8	6	20M-2 Mil.	25-125	Ordovician (Trenton-Stones River)	Limestone	?	Upper Knox
42	Sparta	White	1931	Aband.	5	2	25-500M	Low	Ordovician (Trenton)	Limestone	?	Trenton

shortlived and soon abandoned. The following year, oil was found at Glenmary (38) in southwestern Scott County. This production is from fractured and fissured Mississipian limestones at depths 1100-1150 feet. This field is now 25 years old and only a few wells are pumped at present. Structural work by the state division of geology indicates that accumulation has resulted from a faulted east-west anticline.

Oil was discovered along Boone Camp Creek in Morgan County (27) in 1924 and there has been small but steady production since that time. The producing horizon is in the Fort Payne formation of lower Mississippian age. Most wells have been completed at depths of 1400-1450 feet. No pronounced structural feature has been discovered by surface work or subsurface studies and apparently porosity conditions in the Fort Payne formation are the major factor. In 1928 and 1929 the nearby Seabolt (28) and Coon Hollow (29) pools, respectively, were discovered. The producing zones are fractured and fissured Mississippian limestones.

In 1928 several wildcat wells drilled southwest of Sunbright encountered what are believed to be commercial reservoirs of gas in rocks of middle and lower Mississippian ages, although there has been no development. The accumulation appears to be governed largely by porous and fissured zones with structure of secondary importance.

The northern part of Cumberland Plateau has attracted interest within the past few years and surface work has been carried on by at least one of the major oil compnies. There has been little deep drilling in this area and the oil and gas possibilities of pre-Mississippian rocks are essentially unknown. In the light of present and past Ordovician production to the northwest the Cumberland Plateau is considered one of the most favorable areas for prospecting in the state.

Highland Rim

The Highland Rim, which encircles the Nashville basin, is capped by strata of middle and lower Mississipian age. This physiographic province is subdivided according to its relation to the Central Basin into eastern, northern, and western parts. The major structural feature is the Nashville dome. Detailed structural work in several areas on the Rim has shown that the regional dip off the axis has been interrupted in many places, giving rise to numerous small, but generally sharp, flexures.

The Highland Rim, especially the northeastern part, has attracted more oil exploration than any other part of the state. Testing began in this area in the early 1860's and more than 700 wells have been drilled. Several pools have been discovered, the more important including Celina (5) Peterman Bend (6), Fox Springs-Mitchell Creek (8), all in Clay County; the Spurrier (18) and Riverton (19) pools in Pickett and Fentress Counties; and the old upper Spring Creek (32) district in Overton County. With the exception of the latter pool, in which the lower Mississippian was productive, the production in this area has been from Ordovician starta ranging in depth from 250 to approximately 1600 feet. The more important horizons are: (1) In rocks of Trenton age ("Upper and Lower Sunnybrook") about 250 and 475 feet, respectively, below the Chattanooga black

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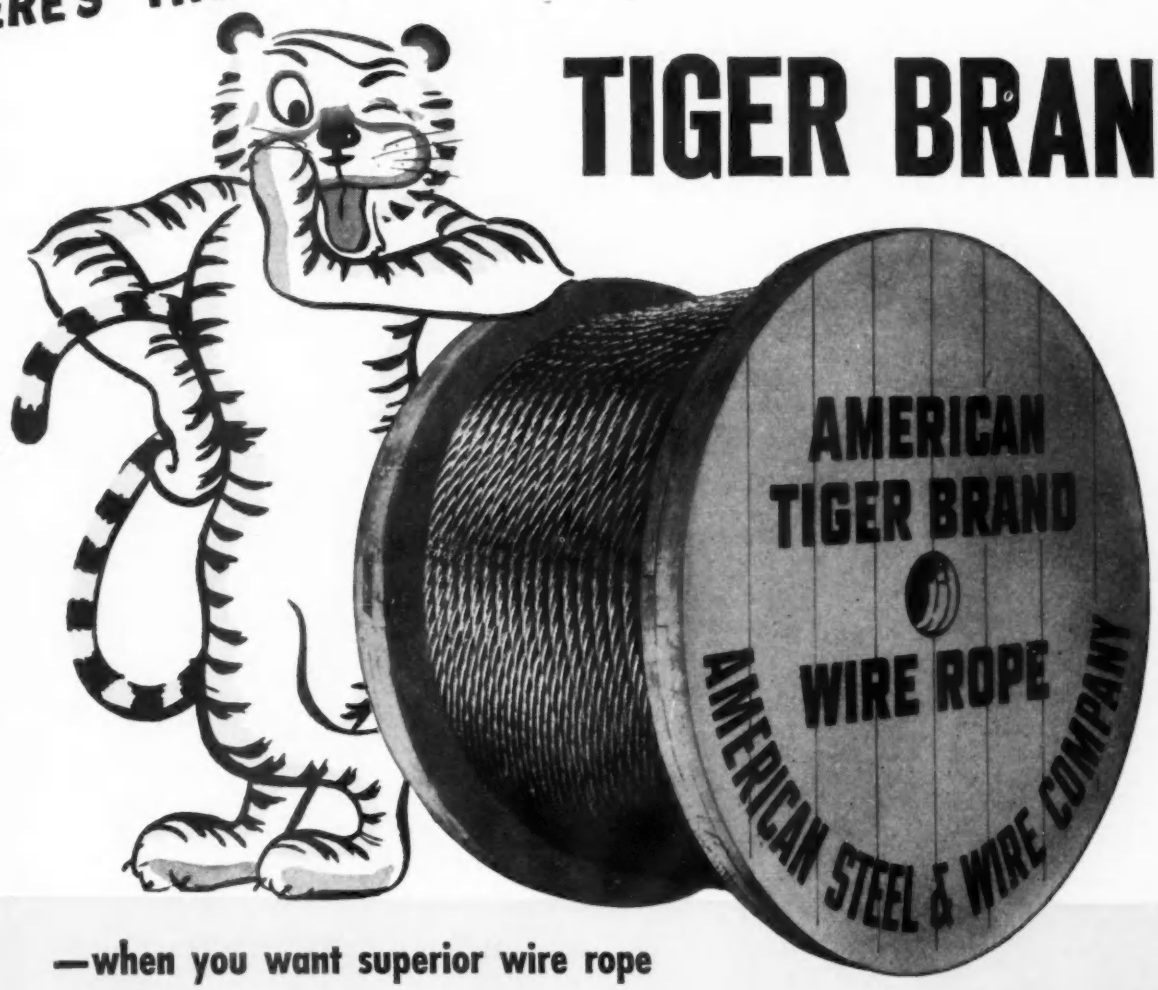

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First—all the steel used in TIGER BRAND is produced in our own mills and is quality-controlled in every step, from the ore to the finished product.

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shale; and (2) in strata of the Black River and Stones River groups, the more prolific zones occurring from 10 to about 250 feet below the base of the Trenton. A few of the deeper tests have found small production in sandy horizons and encouraging shows in the upper part of the Knox dolomite group.

Along the eastern Highland Rim small gas fields (26, 35, 40, 41, 42) have been developed during the past 15 years, but are now essentially abandoned. The gas comes from fissured Ordovician limestones from depths of less than 500 feet to approximately 850 feet.

In Sumner County, on the northern Highland Rim, a few wells (39) have produced small amounts of oil from dolomitic limestones of Silurian age at depth of 200-250 feet. The undeveloped Barren Plains gas field (36) in northern Robertson County produced from rocks of Devonian (?) and Silurian ages.

Detailed studies in many parts of the Highland Rim province have demonstrated that geologic structure is of major importance in the accumulation of oil and gas in this area. While not all of the favorable structures have been productive, there has been no significant production in areas which are definitely known to be structurally low.

Central Basin

The surface rocks of the Central Basin are generally dense to fine-grained limestones, with some shales, of middle and lower Ordovician age. Silurian strata crop out along the western edge of the basin. The major structural feature is the Nashville dome.

With the exception of a small amount of oil in Coffee County (14) and the now abandoned Smithland gas field (25) in southeastern Lincoln County, there has been no production in this part of the state and the possibilities must be considered less favorable than in the Highland Rim and Cumberland Plateau provinces. A few of the deeper wells have penetrated sandy dolomite, in the upper part of the Knox group, which have yielded small shows of oil and gas.

Western Tennessee

Most of West Tennessee falls within the Gulf embayment, a basin of Paleozoic rocks filled with generally unconsolidated sands and clay of Upper Cretaceous and Eocene ages. Paleozoic rocks, ranging in age from Ordovician (Trenton) to Mississippian, crop out along the Tennessee River. This area, the Western Valley, is usually treated as a separate physiographic and geologic province of the state.

The major structural feature in the Western Valley is a general north-south upwarp through Decatur and Benton Counties. The western limb of this arch is practically unknown due to cover by the sediments of the Mississippi embayment. The Upper Cretaceous and Tertiary beds dip gently to the west at a rate of 20-40 feet per mile toward the axis of the embayment. Since most of the beds are essentially unconsolidated, surface structural mapping is difficult and the results are questionable. It is an area for geophysical prospecting.

Thirty-five wells have been drilled in the embayment area in Tennessee and seven in the Western Valley. Oil and gas shows have been reported in the Upper Cretaceous and Paleozoic rocks, but there has been no production.

Underground High-Pressure Air Used In West Texas for Pumping Wells

By TOM L. TURNER, Staff Writer

ECONOMY plus is gained by numerous operators in the Sharon Ridge pool of Scurry-Mitchell Counties of West Texas by the use of an underground high-pressure air supply to pump oil wells. Mother nature furnishes the power and man's ingenuity harnesses it for his own use.

The Sharon-Ridge pool was discovered in 1924 when production was encountered at 1650-1750 feet. Later in 1938 deeper production was found at 2250-2450 feet. Throughout the entire field a strata of high-pressure air was encountered at 1100-1200 feet with streaks to 1400 feet. Realizing the potentialities of this tremendous power, operators immediately began to utilize it for pumping and drilling wells. Quite a number of wells is now being pumped by this power.

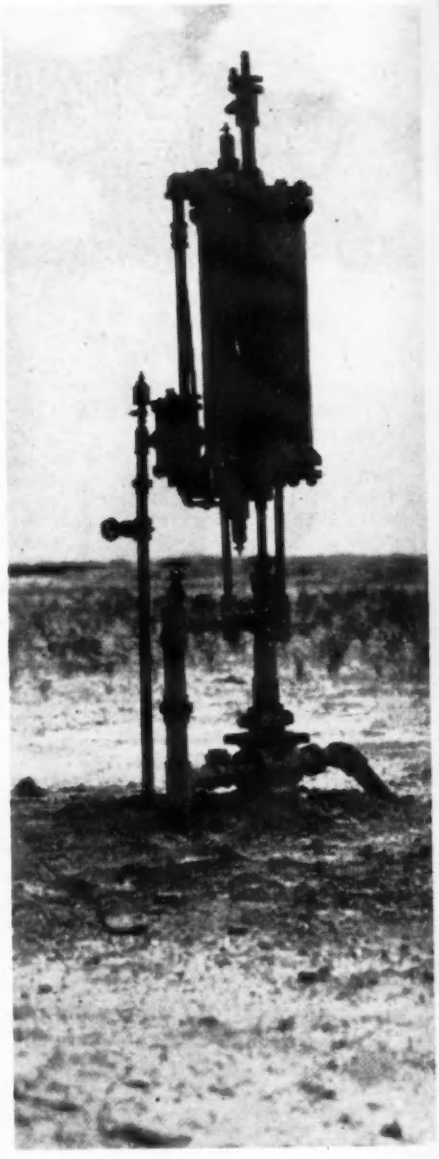
Equipment for the pumping of wells by air power is quite simple, consisting of an air head above the pumping head which is activated by air piped to it through the annular space between the oil string and the outer protective string of casing. The head which contains a power piston and trip mechanism is inexpensive, contains few working parts and requires little maintainence. The air head's piston is attached to the polish rod and the sucker rods are raised and lowered by the action of the piston within the air head in the same manner as they are raised and lowered by a pumping unit of the conventional walking-beam type.

The Sharon-Ridge pool has 106 deep wells and 71 shallow wells, of which 105 deep wells and 68 shallow wells are producing. Only 8 deep wells are flowing at last account while none of the shallow wells are flowing. All wells except one were drilled with cable tools of the spudder type. The one exception was drilled with a portable rotary rig but after the one well it was moved out and development continued by spudders.

Combination air and gas wells predominate throughout the field. The combination wells were usually cased with a few joints of 10-inch surface casing, 8-inch to the air strata, 7-inch to the oil pay and tubed with 2-inch tubing. In the combination wells, the air for power is taken off through the bradenhead from the annular space between the 8-inch casing and the 7-inch casing. In a number of cases the air has been cased off and one air well for the entire lease drilled from which air was piped to each well and other places as needed.

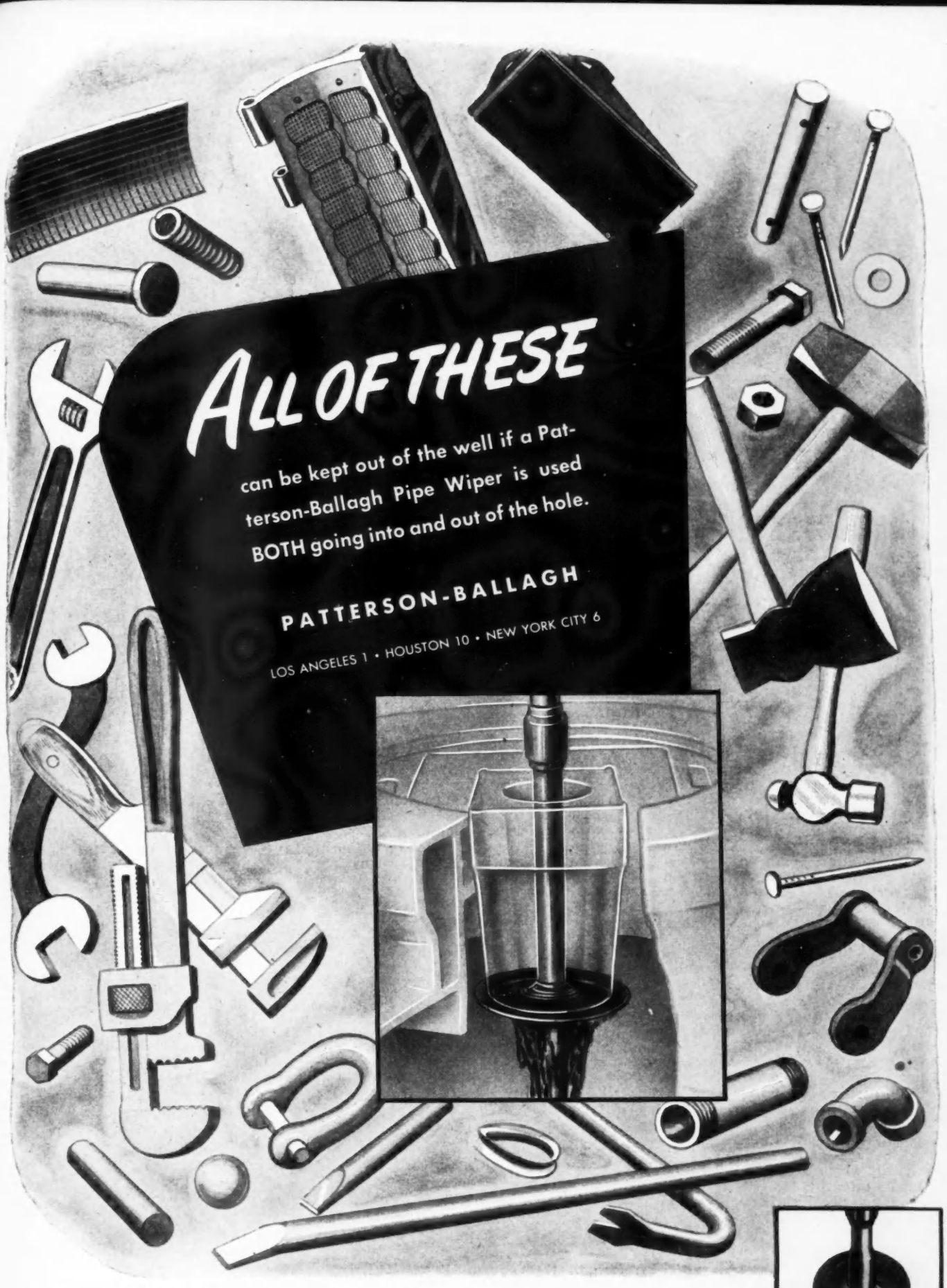
No analysis has been made of the air but it is non-combustible and known to contain very little oxygen. A few men have been "knocked out" by escaping air in the cellars but they are revived immediately upon being taken into the open air. None has suffered any bad after effects of such experience.

Pressure encountered is around 350-pounds with practically an inexhaustable supply. No appreciable drop in pressure has been encountered by wells that have been pumping by this method for 20 years. Several operators refuse to utilize this air and have installed pumping units of the conventional walking-beam type. At one time air was dissipated into the open in an attempt to rid the holes, but after a loss of pressure dissipation was discontinued and the air kept for other uses.



Air head containing piston attached to polish rod which raises and lowers the sucker rods on pumping well powered by high-pressure underground aid.

Pumping oil wells is not the only use for the air force. Pipe-line pumps are operated with it as are other engines. At one time several operators used the air to drill with by placing 45 H.P. steam engines on the rigs and piping the air to them. This method of drilling, however, now has been discontinued in favor of regulation power engines.


ALL OF THESE
can be kept out of the well if a Patterson-Ballagh Pipe Wiper is used BOTH going into and out of the hole.
PATTERSON-BALLAGH
LOS ANGELES 1 • HOUSTON 10 • NEW YORK CITY 6

PATTERSON-BALLAGH PIPE WIPER

Equipment in maintenance yard of Bell & Loffland being stripped of caked dirt, burnt-on grease and weathered scale in preparation for painting.

Efficient Cleaning Job on Drilling Machinery With Portable Equipment

AS FREQUENTLY as necessary to preserve drilling units and to enhance their appearance, Bell & Loffland regularly give all of their engines, draw-works and trailers employed with these tools a general cleaning and painting. When the rigs are brought into the yard for an overhaul or can be reached without difficulty on a location after a well has been completed, hot water plus an effective detergent, sprayed on the surface loosens the caked grease, checks paint and removes all foreign matter down to the original metal. The surface is thus prepared for a new coat of paint without danger of peeling or alligatoring, one or both of which invariably happens when paint is applied on a surface covered with mineral oils.

The cleaning machine used by Bell & Loffland is mounted on a two-wheeled trailer—improvised by employing the front axle of a light automobile—equipped with trailing facilities to connect behind a pick-up or truck. The trailer frame is made by using available angle iron and flat straps for braces, substantial enough to support the load carried. Hot water is supplied by a boiler in which a single spiral coil is placed, heated by domestic fuel oil, the combustion of which is supported by a motor driven blower. Two common 50-gallon oil drums set behind the boiler in which the detergent and chemicals are dissolved in water. A small drum mounted between the 50-gallon barrels contains the fuel oil for the boiler. Water taken from hydrant or boiler-feed tank is pumped with a small plunger pump mounted beside the boiler, delivering cold water to the heating coil and forcing it to the spray nozzle used to clean the equipment.

No steam is generated as such in the boiler, as the water travels through the heating coil to the outlet where a connection is installed for attaching the steam hose which delivers the water and cleaning compound to the spray nozzle. The nozzle is of the type usually employed by garages when steam cleaning engines and under surfaces of the chassis, and is attached to a convenient length of pipe so the business end of the spray is several feet from the operator.

A better surface is obtained by giving the equipment a coat of petroleum solvent, either mopped over or spread with a brush. This preliminary operation breaks down the resinous gums commonly adhering to surfaces when oil is oxidized over paint. When two or more pieces of equipment are to be cleaned, the time which is taken to spread the solvent on the dirty surface usually provides sufficient penetration that steaming can be begun at the point where the first solvent is applied.

Much time is saved with this outfit and a better job is done, as wire brushes and scrapers seldom remove all the gum and caked dirt from parts most difficult to reach by hand.

Trailer containing boiler —or water heater—with chemical drums, fuel pump, water pump and combustion blower used by Bell & Loffland to strip drilling tools before painting.

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PREVENTS STUCK CASING
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FEW PARTS—RUGGED CONSTRUCTION

The GRANT Type "R" Underreamer is simple in construction. RUGGED enough for modern drilling practice.

The positive, dependable expansion assures full gauge hole, a guarantee for fast, safe landing of casing.

Widely used for side-tracking junk or fish lost in hole.

Sufficient expansion for a thick cement sheath around the casing, thus assuring a good water shut-off.

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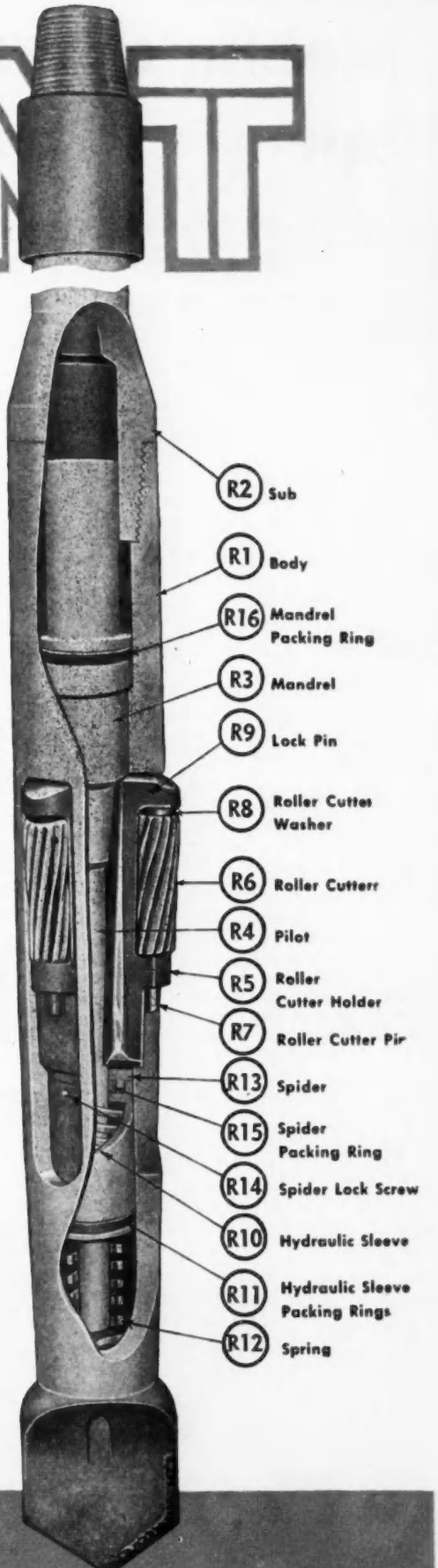
Trouble free. Cutters, always in collapsed position, expanded with pumps. All parts securely locked within the body, thus preventing loss of parts in the hole.

Prices on GRANT SPECIAL EXPANSION UNDERREAMERS on request.

See Composite Catalog or write for full details.



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Mobile Overhaul Unit Speeds Pump Repairs

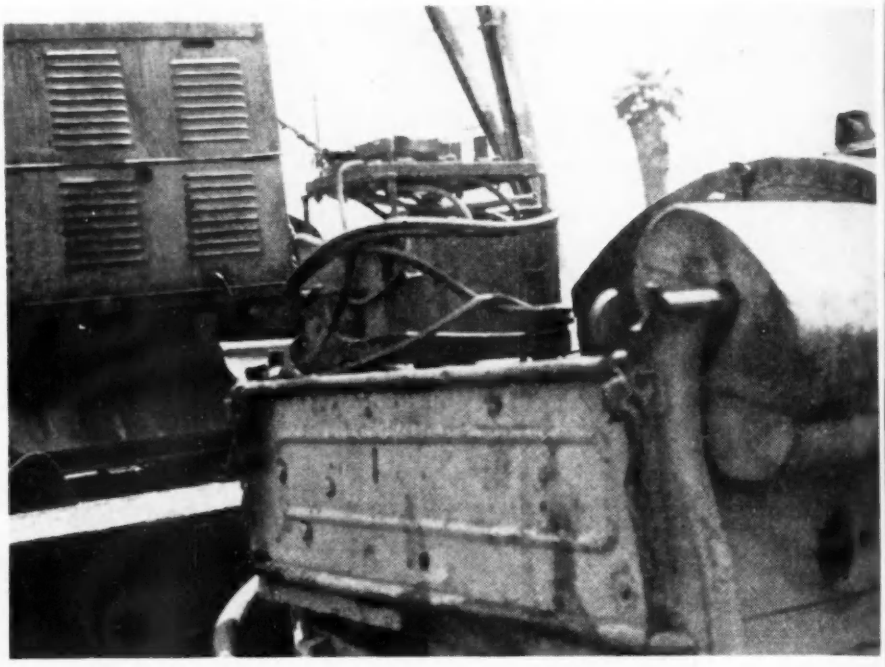
Truck equipped with starting battery, spare motors and other specialized equipment, permits on-the-job reworking of engines and reduces downtime of pumping units

A LARGE producing company found that, after the number of pumping wells had increased beyond the capacity of the individual pumper to care for, it was necessary to consolidate the maintenance under a separate department. This department does nothing but attend to the ills of individual pumping engines, service the starters and keep the wells pumping to their greatest allowable production.

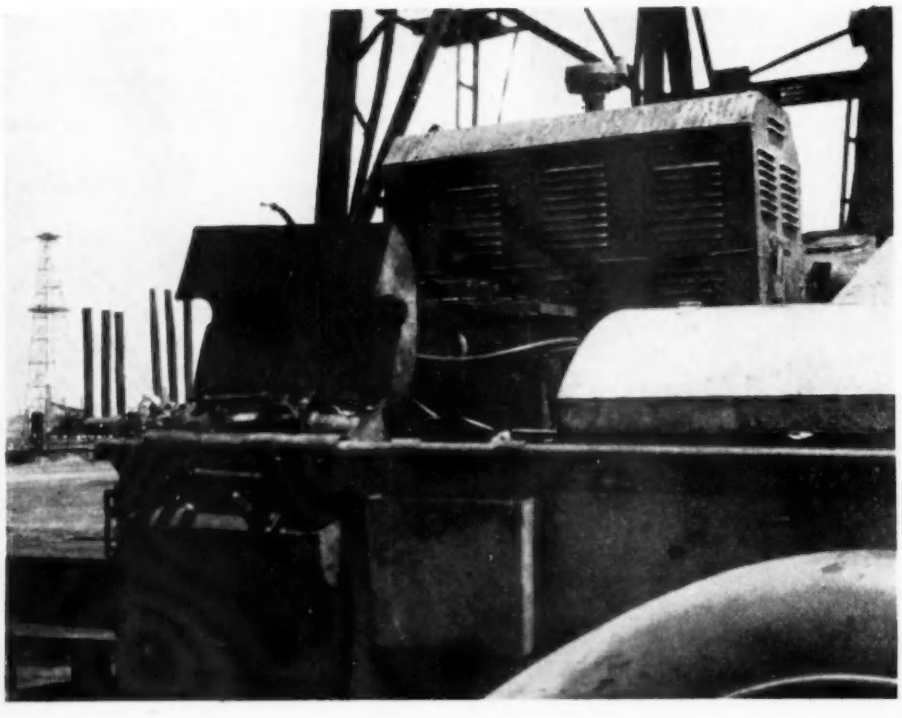
To provide economy of maintenance and to expedite starting of dead engines, a truck is equipped with practically all of the tools required to overhaul engines and starters. About all that is not done in the field is to completely rebuild the engines and overhaul ignition units. Ignition units, for example, are replaced with ones in good condition while the parts removed are taken to the shops where testing instruments are consolidated for such work.

This truck has compartments and drawers where tools are kept for the men who operate and service engines. In addition to an adequate supply of hand tools, wrenches and other equipment, the truck has a special battery for starting engines which is also the battery that operates the truck. A cage is built in one corner of the pick-up body where two conventional 6-volt batteries are installed, wired with appropriate switches for use either as 12-volt or as 6-volt unit. When used as 6-volt batteries, the two are connected in parallel, giving the battery double the normal output in amperes. When a pumping engine is stiff and turns over slowly, the switch is cut over to provide 12-volt current momentarily, so that the speed of the turn-over is increased for better starting. Charging of the battery is done with the pick-up truck generator in the usual manner, but it is set for augmented current output to compensate for heavy current drainage when starting several pumping engines during the day.

On the other corner of the pickup is a hinged compartment where rebuilt starters are kept for emergency installation, so that when an engine is found to have a starter in bad condition, a replacement can be obtained quickly and installed with the least delay. Defective starters are reconditioned in the central maintenance shop and a supply of good ones kept on hand at all times for replacement.



Below—This "saddle-bag" container, designed to straddle the side of the service truck has compartments in which overhauled starter units are transported, ready to be lifted out and installed on pumping engine when the normal unit fails to function. Box prevents damage to overhauled units through contact with other equipment carried in truck bed.



Above—Paired batteries, wired to provide either 6- or 12-volt current, are charged from truck generator, and provide quick kick-off where unit battery has failed. Sluggish engines are given "shot" of 12-volt current when normal voltage fails to obtain desired result immediately.

Much Time Saved

With this type of maintenance, the routine pumper is relieved of all responsibility of anything but to attend to the duties connected with keeping the wells in condition. The two men assigned to the pickup are men who have had wide experience with various types of pumping equipment, particularly multi-cylinder gas/gasoline engines. Much time has been saved with this truck, and a greater percentage of wells have been kept on the beam than when field repairs were made by the individual pumper.

THE WHOLE IS GREATER THAN ANY OF ITS PARTS

THE PRACTICE *of leaving superfluous mechanical control equipment tied up permanently in the well structure is wasteful. It accumulates a lot of expensive and top-heavy equipment at the top of the well, adds unwanted height to the structure, uses up space which is always at a premium, and leaves this equipment practically useless and rusting away.*

★ **In Gray Systems of Well Control, all types of control equipment—valves, blowout preventers, strippers, etc.—are available as accessories which may be used when needed, removed when not needed, reinstalled when and where needed, and repaired when the necessity arises. The result is greater efficiency, safety and economy.**

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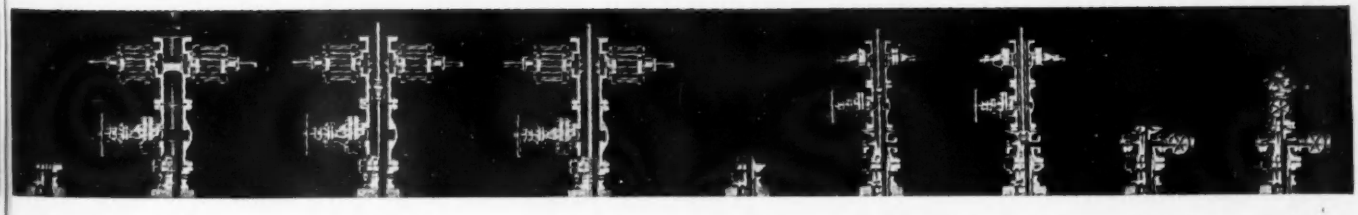
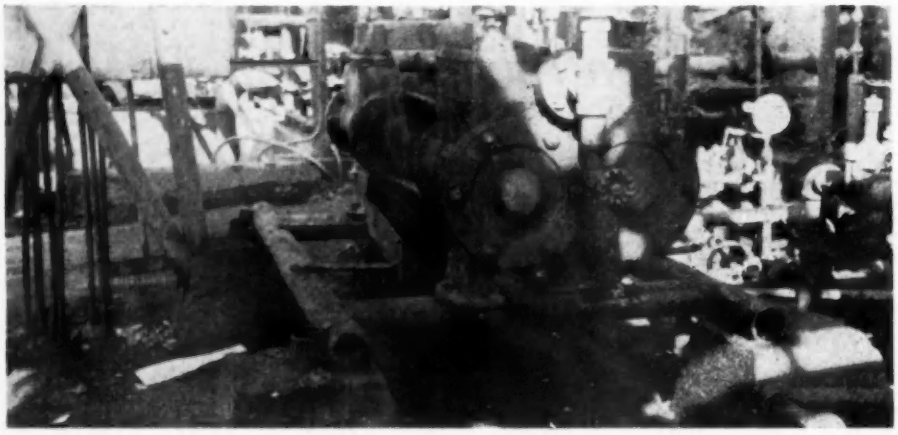


Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

OPERATING HINTS *For Production Men*

Temporary Pump Support Speeds Emergency Setup



Welded support, utilizing scrap drill stem sections, is formed to bridge old concrete piers and underlie bolting sections of both ends of pump, affording sturdy yet portable emergency mounting.

PUMPING SUPPORTS

When an emergency pump unit must be installed, the plan followed by one company of mounting the pump on a frame of salvaged drill pipe saves time and insures the proper support for the pump casting, regardless of the type of blocking below the frame.

The frame is formed from two long side pieces, with a pair of short cross members welded between them and so spaced as to take the foundation bolt-hole spacing of the power and fluid ends of the pump. The line contact obtained between pump casting and curve of the pipe surface is sufficient to give proper bearing, but may be extended by the welding of small plates or pads to the pipe if desired.

A pan of light tank steel, with a pair of extended bearing supports to span the gap between the side rails, serves as catch basin for pump leakage and prevents softening of the ground below the unit.

The unit shown in the illustration ingeniously utilizes an old concrete pier group, the drill stem side rails falling just within the pipe cores in the centers of the four piers. The pump frame is held against lateral motion by four latch pieces or dogs, formed from short half sections of pipe and welded against the frame members, being so placed as to engage the pier cores. Further rigidity of mounting might be obtained by welding these latching members to the pier center, but such additional securing would be indicated only when the pump is used in extra severe service, with excessive vibration or pounding.

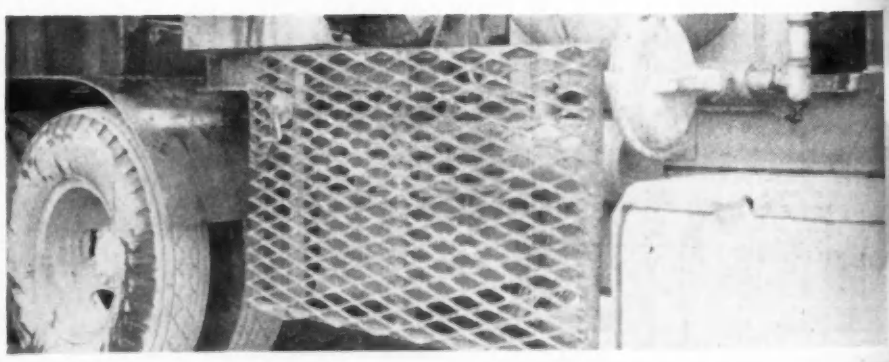
To change pump to new location it is necessary only to break pipe joints, as semicircular latch members simply lift to clear retaining stubs of foundation core pipes.

Running Board Extension Carried on Truck Frame

WORKING PLATFORMS

Short sections of the walk or running board extension on a pulling machine can be stored ready for immediate use by providing a set of inexpensive hangers attached to the frame of the unit. Short stud bolts welded to the frame to extend through the mesh of the grating are used. To prevent the section of grating from working loose, a large washer slipped over the end of the bolt outside the grating is sufficient.

A wing nut, or a nut with a short piece of welding rod tacked to one side provides a quick method of storing the section or breaking it out for use.

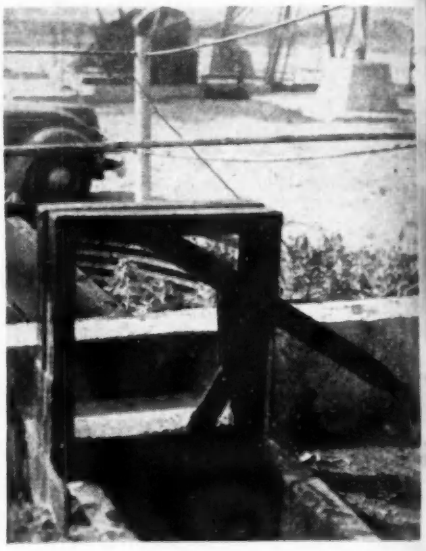


Non-skid grille of expanded metal, fitted as extension to usual working platform of servicing truck, is carried on side of machine frame by bolts extending through mesh and retained with large washers.

Quick-Closing Gate Prevents Flume Losses

FIRE-WALL CLOSURES

If a positive shut-off is required in a flume which carries bottoms from a tank battery, a gate somewhat out of the ordinary can be made by using only a relatively small amount of iron and steel, but one which will provide effective service for many years. The frame of this gate is constructed of common two-inch angle iron serving also as the guide for the sliding gate. The gate itself is a flat sheet of tank steel carefully cut to fit snugly in the guides at the sides and at the bottom when seated.



Lever position and linkage serve to lock open and closed positions of sheet steel flume gate.

A long lever is pinned by a bolt between the two top cross members

BRADEN
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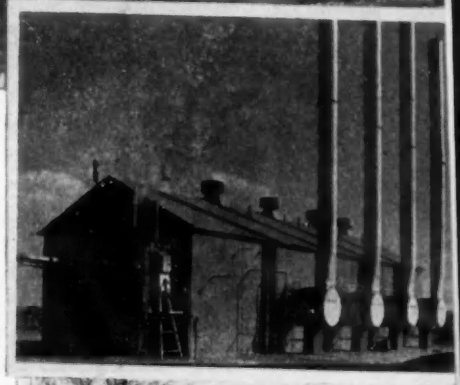

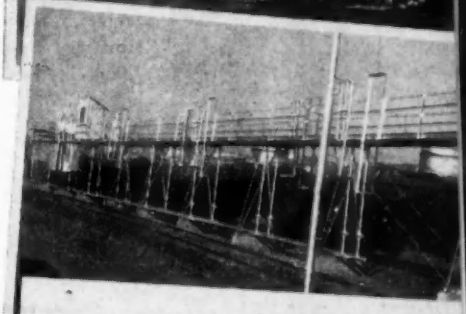

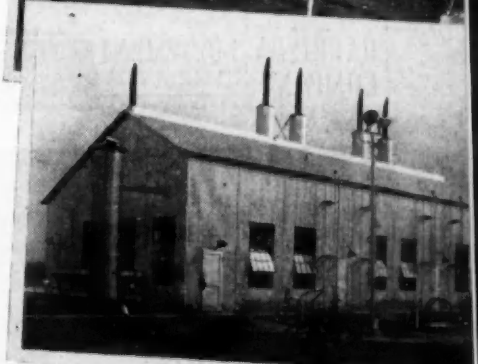
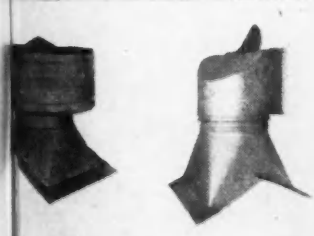
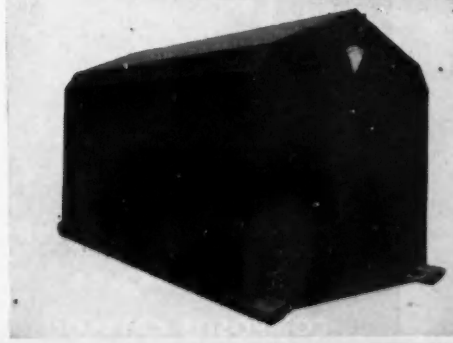

Airplane Hangars
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Engine Houses
Garages
Warehouses
Machine Shops
Supply Stores
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—and—
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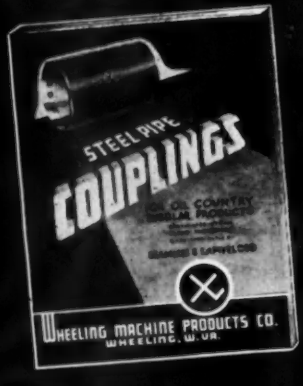
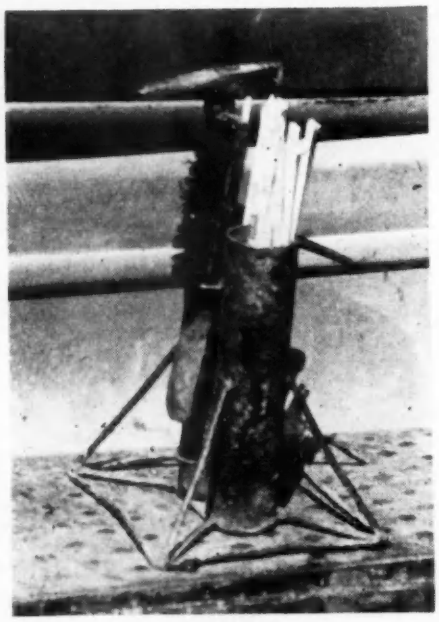


PAGES 3079 THRU 3098
IN THE 1943-44
COMPOSITE CATALOG

with free working links connecting the top of the gate section. Swinging the lever up and over to the left or from the operator opens the gate and at its furthest point of travel locks the gate open.

Bringing the lever towards the operator and down to the lowest limit of travel seats the gate and locks it shut at this point. The unit may be made as a separate piece of equipment, to be installed in a wooden flume, or welded permanently in a flume of steel leading from the tank battery to the water pit.

Skeleton Rod Carrier Aids Repair Welding



Light pipe section, with supporting base and braces of heavy wire retain rods in vertical position.

WELDING ROD CONTAINER

A convenient and handy electrode carrier can be made in a short time, the material to construct being almost always available anywhere. A couple of light metal cylinders about two-thirds the length of the rods and some heavy wire comprise the bill of material. The cylinders are joined, in this case, by welding short stubs of bare wire to the lower ends to stiffen and provide a sort of sub base.

The entire base is in the form of a large rectangular web made by shaping the outline with a single row of wire, other pieces being welded in each corner to connected sub base of the electrode cylinders.

Four diagonal braces from the outer corner of the wire base are laid at an angle of about 45 degrees to the sides of the cans. A stiff bail is connected on one side of the group for carrying while a shorter loop is tacked to the opposite side to receive the handles of a wire brush and a slagging hammer. The wide base prevents tipping and keeps the set upright on rough and uneven surfaces such as the earth removed when digging a bell hole beside a pipe line.

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

Welded Portable Stand Removes Working Hazard

Serving a number of useful purposes around the pumping well, the light two-step stand used by one large operator facilitates servicing of the pumping unit and also is of aid when the well is pulled. Built of salvaged 1-inch pipe and two light sheets of non-skid flooring, the all-welded structure is accessible from two sides and is easily skidded around the location. Its cheapness of construction permits one to be placed at each well.

SWITCHER'S PLATFORM

On wells whose original derrick floor has been removed, the stand is of particular value as it permits the pumper or well puller to reach the hard-to-get-at bearings and points of lubrication, and, better than the conventional ladder, is safer, providing foot room for moving around, and space for placing of tools, oil cans, etc. When the well is pulled the broad steps of the stand can be used in a number of ways.

On certain types of truck-mounted pulling units, the hoist operator has to build an improvised platform on which to stand, but with this unit the problem is simplified, providing a broad platform on which he can stand and have easy access to the controls.

Expanded metal steps, carried on sturdy pipe frame, with two sides railed in, form this stand.

PUMPING ENGINES DON'T GROW ON TREES!

ALLIS-CHALMERS ENGINES for 1945 are being scheduled Now

Just as the production schedules on the many Allis-Chalmers Engines, being delivered to the oil industry in 1944 were planned last year, so the production schedules on the Allis-Chalmers Engines that will be delivered in 1945 have been in the planning stage for months.

Power engines just don't grow on trees — it requires many months to secure the materials and build engines, even after the production schedule is planned.

We are doing all we can to take care of your present and future requirements for Allis-Chalmers Engines. But it would help if you will estimate your needs and place your engine orders as early as possible.

FRED E. Cooper

Hale Station, TULSA, OKLAHOMA

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Pipe Line Review

Texas-to-West Virginia Gas Line Reported About 50 Percent Complete

Construction of the Tennessee Gas & Transmission Company 24-inch line from Corpus Christi to West Virginia is about 50 percent complete with 639.8 miles of pipe laid, welded and backfilled. Completion is scheduled for some time in October. Good progress is reported on all compressor stations, river crossings and the dehydration plant at the Corpus Christi end of the line. Twenty three spreads including 2 small gangs have completed 292.6 miles in the past 30 days or an average of about 10 miles per day.

Swinerton & Walberg Company has moved into Tennessee where it will connect at the Tennessee river and lay approximately 30 miles of line westward.

J. R. Horrigan Construction Company completed its contract of 47 miles in West Virginia and is moving onto one spread in Tennessee where it will work east from the Buffalo river. It also will work a spread west from the Big Sandy river in Kentucky.

Texas-Louisiana Work

Williams Brothers Corporation has completed 65 miles of line west from Corpus Christi in Texas and in Louisiana east from the Ouachita river, it has opened 43 miles of ditch. In Arkansas, Mississippi and Tennessee, this corporation is steadily progressing with 60 miles of line completed east from the Louisiana-Arkansas State line, 63 miles completed east from the Mississippi river in Mississippi and in Tennessee they have completed 15 miles east from the Tennessee-Mississippi line, 9 miles west from the Tennessee river, and 43 miles west from the Tennessee-Kentucky line.

N. Saigh Company has completed 27 miles on one spread and 44 miles on another west of the Brazos river in Texas.

Brown & Root have completed 30 miles east from Splendoria and 16 miles west from the Sabine river on their Texas spreads.

R. L. Smith Construction Company has completed 5 miles east from the Sabine river in Louisiana.

Midwest Engineers have completed 21 miles west from Bayou D'Arbonne in Louisiana and have practically completed 4 miles from Bayou D'Arbonne river to the Ouachita river.

Betchel-Dempsey-Price have completed 69 miles of line east from Batesville in Mississippi. In Kentucky 36 miles east and 8 miles west from the Tennessee-Kentucky line have been completed by this contractor as have 36 miles east and 26 miles west from Kent river.

Pipeline Construction Corporation in West Virginia has completed 20 miles of line west from Cornwell Station.

River Crossing Work

Work on the river crossings both submerged and bridge is coming along satisfactorily with crossings complete on the Guadalupe, Trinity, Tennessee, Duck, Cumberland and Kentucky rivers. All these crossings were built by Williams Brothers Corporation. Other crossings being constructed by this company are in good shape with the Nueces crossing practically complete and the Clear Lake crossing three fourths completed. The Neches and Angelina crossings are one fourth completed. Midwest Engineers are practically through with the Big Sandy and Kanawha river crossings and steady progress is reported on the Bayou D'Arbonne and Ouachita crossings. Williams Brothers Corporation is also steadily progressing on the Sunflower and Tallahatchie crossings. Pittsburgh-Des Moines Steel Company will do the steel work on the Greenville highway bridge over the Mississippi river and Williams Brothers Corporation will install the low land pipe.

Bridge crossings are also progressing steadily with Pittsburgh-Des Moines Steel Company building across the Colorado, Brazos, Sabine and Red rivers while the Austin Bridge Company is constructing that over the Buffalo and Dix rivers. The Red River bridge is practically complete while all the others except the Sabine are approximately three fourths complete. The Sabine bridge is half finished.

Compressor stations and the dehydration plants are well along with their schedules. Station 6 and station 8 are testing piping. All major equipments have been received except some steel buildings.

Test crews are ready and the first 20 miles of pipe out of Corpus Christi has been tested around the dehydration plant and found satisfactory.

Kentucky-West Virginia Pipe Line Hearing Soon

The Federal Power Commission has scheduled a hearing on August 30, in Washington, on applications filed by three Columbia Gas and Electric Corporation subsidiaries for authority to construct new facilities in Kentucky and West Virginia.

The applications call for construction by the Cincinnati Gas Transportation Company of 400 feet of 8-inch pipe line, with a measuring station at Leach, Kentucky; construction by the Warfield Natural Gas Company of two 10-inch pipe lines, 1350 and 2034 feet in length, respectively, and a measuring station near Burnaugh, Kentucky, and building by the United Fuel Gas Company of 1995 feet of 10-inch pipe line between its own and the new Warfield line, 450 feet of 12-inch line at Cincinnati's Kenova compressor station, and 32,800 feet of 12-inch and 4000 feet of 16-inch line between the Tennessee Gas and Transmission Company's line in Kanawha County, West Virginia, and its compressor station in Roane County, West Virginia.

On August 22, the commission will hold a hearing in Washington on applications of the Southern Natural Gas Company for construction of loop lines and facilities in Alabama, Mississippi, Louisiana and Georgia.

The FPC, on August 1, authorized Cities Service Gas Company to operate the new 231-mile 26-inch natural gas pipe line between the Hugoton field and Kay County, Oklahoma, until June 30, 1954, and authorized Cities Service Transportation and Chemical Company, which built the line, to construct 43 miles of pipe lines to connect 37 new gas wells to be drilled in the field with the Guymon compressor station, where seven additional 1000-horsepower compressor units are to be installed. These facilities will increase the capacity of the Hugoton line from 140,000,000 to 213,000,000 feet per day.

The Commission on August 3 announced the granting of an application of the Memphis Natural Gas Company for rehearing on the FPC order of June 10, last, dismissing an application for construction of three 18-inch pipe lines aggregating 61 miles, paralleling the unlooped portion of the company's line in Chicot County, Arkansas, and Bolivar, Coahoma and Tunica counties, Mississippi, which would increase the capacity of its system by 21,000,000 feet per day.

Wyoming Line Work Progressing Satisfactorily

Good progress is reported by contractors in construction of Stanolind Pipe Line Company's 240 miles of 12-inch crude oil pipe line from the Elk Basin pool of northern Wyoming to the refinery at Casper.

I. C. Little, of Dallas, contractor for the section of line included in the northwest and middle portions of the project has laid more than 18 miles of line and was averaging about ½ mile a day on each section. Sharman and Allen of Houston, who are laying pipe in the southeast section of the line, have laid about 25 miles and were progressing at the rate of about a mile a day.

Montana Line

Oklahoma Pipe Line Company plans early construction of 7 miles of 8-inch line between Frannie, Wyoming, and Warren, Montana. This line will deliver oil from the Frannie field to the Warren Station of the Yale Oil Pipe Lines Company's system now under construction, for delivery to Carter Oil Company's refinery at Billings, Montana.

South Tyler Outlet

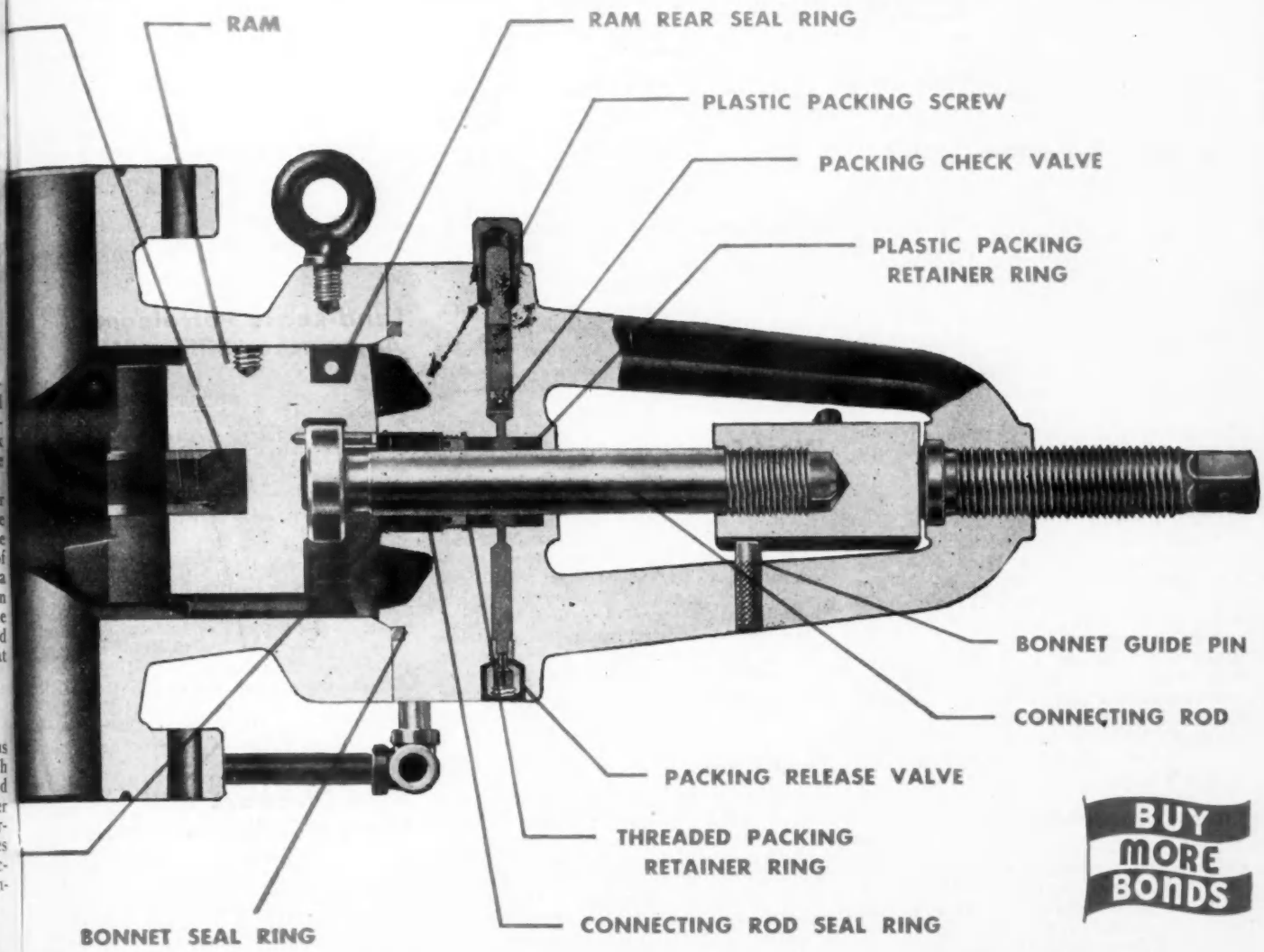
Phillips Petroleum Company is starting construction of a gathering system in its recently discovered South Tyler field, Smith County sector of East Texas, with a 3½-mile 4-inch line extending north to connect with Magnolia Pipe Line Company's East Texas Field-Corsicana 12-inch carrier. The discovery has an allowable of 200 barrels daily, and the company is starting four tests, including outposts.

Laying Gas Line

Panhandle Eastern Pipe Line Company has awarded contract for the laying of 18 miles of 22-inch line from the end of the company's present 26-inch line into the Liberal, Kansas, station, looping the present 22-inch line. The project includes crossing the Cimmaron

Ram Change

NEW CAMERON PRESSURE-OPERATED BLOWOUT WILL PAY FOR ITSELF IN RAM CHANGING TIME ALONE



BUY MORE BONDS

WEIGHS 30% LESS THAN "SDA" MODELS—The low overall height and compactness of the "QRC" design facilitates transporting the unit as well as its assembly in drilling control manifolds in the field.

10,000 LBS. TEST PRESSURE MODELS—6" and 10" sizes available in both Series 900 API, 6000 Lbs. Test and Series 1500 API, 10,000 Lbs. Test Pressure Models; 12" size available in Series 900 API, 6000 Lbs. Test Pressure Model only.

While the above comprise the most noteworthy features of Cameron Type "QRC" Blowout Preventers, still other mechanical improvements have been added to assure long, trouble-free operation under the most severe conditions. In addition to these, such proven features as: Patented Self-Feeding Ram Packing, oversize bore to permit the passage of casing and tubing hangers, self-centering rams which automatically center the pipe in the hole, round ram bore in which cuttings cannot accumulate and prevent full closure of the rams, and others combine to make the Type "QRC" Cameron's greatest achievement in drilling control equipment.

CAMERON IRON WORKS, INC.

711 MILBY ST., HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. California: The Howard Supply Co., Los Angeles. Rocky Mountain: Mountain Sales & Service, Casper, Wyo.

river at Liberal. The company plans installation of 1300-horsepower twin tandem unit at Montezuma, Indiana, and two 880-horsepower units at Hansford Camp station in the Texas Panhandle, as well as miscellaneous gathering lines in the Texas Panhandle.

North Monahans Gathering System Being Installed

Stanolind Pipe Line Company is installing a gathering system in the North Monahans field, Winkler County, West Texas, and will build a 4-mile 4-inch line from its field station thence north to connect with Magnolia Pipe Line Company's Wink-Midland 10-inch trunk line. Stanolind Oil & Gas Company discovered the North Monahans field last March, and has three additional wells in process of completion, while a big drilling program will follow if these make profitable wells.

Increase Fullerton Outlet

Magnolia Pipe Line Company will boost its pipe-line outlet for the Fullerton field, Andrews County, West Texas, to 21,000 barrels daily through installation of a 5½-mile 6-inch loop parallel to the original 4½-inch line that connects this high-gravity oil area with its Andrews station and tank farm on the Slaughter - Seminole - Midland system. An 8-mile 6-inch loop was built last April on the Andrews station end of the Fullerton field outlet, and the new unit will provide two carriers. Fulton Construction Company, Lubbock, Texas, is scheduled to complete the loop by mid-August.

Mississippi Line

Oklahoma Pipe Line Company will build 17 miles of 8-inch line from the Cranfield field in Mississippi to Gibson landing on the Mississippi River, and 3 miles of additional gathering lines to the Heidelburg pool. The company is gathering from six wells in the Cranfield field. In the Heidelburg field the Oklahoma Pipe Line Company operates 5 miles of gathering lines serving 16 wells and operates 2 miles of main line which delivers the oil to a loading rack at Heidelburg.

Line Completed

A 34-mile stretch of 12-inch pipe line extending its system from a point north of Holdenville to the Citra and Lula gas fields of Coal County, Oklahoma, has been completed by the Oklahoma Natural Gas Company, including loops to smaller areas along the route. The company is presently laying seven miles of 6-inch pipe line from the Center Point pool in Pottawatomie County, to tie in with its system near Shawnee, Oklahoma.

30 Years—175,000 Miles

Charles E. Chamness of Bartlesville, who has been employed by Sinclair Refining Company for more than 30 years, has been given a gold medal by Harry F. Sinclair, president of the company, with the inscription: "To Charles E. Chamness, champion line walker of the world, 1912-1944."

Chamness daily travels in Washington County for the pipe line division of the Sinclair Refining Company and figures that in 30 years he has walked more than 175,000 miles.

Dutch Oil Properties Now Held by Japs, Being Bombed

The allies are maintaining a steady air offensive against Japanese-held oil fields and installations on Netherlands New Guinea. The most recent target of American planes was the Vogelkop oil field near Sorong, in the westernmost section of the island.

The Vogelkop field was operated, prior to the Japanese invasion, by the Netherlands New Guinea Petroleum Company. Before the enemy could seize the field in 1942, all its installations were destroyed, in compliance with the scorched-earth policy adopted by the Netherlands East Indies government.

During the course of the past two years, the enemy has, however, been able to resume limited production. The attack on July 22 by American bombers proved a serious setback to the Japanese plans.

Northeast of Sorong, at Manokwari—which is an oil-refining center for nearby fields—allied planes dropped 36 tons of bombs on installations and airfields, while farther south shore installations on McCluer Gulf on which another refining town, Babo, is located were also bombed. The fighting now in progress opposite Wake Island, in the Sarmi area of Netherlands New Guinea, can also be linked to the battle for strategic ports and oil fields, for near here are situated the remaining developed petroleum sources of the island.

West Edmond Lease Sale

The Carter Oil Company has purchased half interest in 15,000 acres of leases in Logan and Kingfisher Counties, Oklahoma, north of West Edmond from Kerlyn Oil Company, for a consideration of $3,000,000, part cash and the balance from production. No drilling obligations were involved. Phillips Petroleum Company owns the remaining interest in the block which centers in townships 15 and 16 north, ranges 4 and 5 west. Two tests have been started on the side of the block by Phillips Petroleum Company.

Lease Sale

Auction of Osage oil leases at Pawhuska July 26, brought bonuses of $15,425 to 50 of the 85 tracts offered. The majority of the leases which, with the exception of three tracts were in lots of 160 acres each, brought the minimum of $200 per tract. Two tracts were sold for $1200 and $1700 respectively.

Federal Gasoline Tax Shows Drop from 1943

Federal gasoline tax collections for the fiscal year which ended June 30 showed a loss of $17,500,000 from those of the preceding fiscal year, but revenue from the lubricating oil tax was up $9,000,000 and from pipe line transportation $2,000,000, it was reported by the Internal Revenue Bureau July 27.

Revenue from gasoline for the year was $271,216,502 against $288,785,826 for the preceding year. The 1943 collections showed a drop of $40,000,000 from those of 1942, indicating a net loss to the Government as a result of rationing of well over $57,000,000.

Lubricating oil receipts for the year were $52,473,093 against $43,318,312 for the preceding year, and revenue from pipe line transportation was $15,850,856 against $13,672,086.

For the month of June, the government collected $21,028,516 from gasoline, against $26,787,672 in May; $3,808,507 from lubricating oil, against $5,258,971, and $1,621,370 from pipe line transportation, against $1,576,888, it was reported.

Barnsdall and Sohio Buy Fain Drilling Equipment

Barnsdall Oil Company and Sohio Oil Company announce joint purchase of the assets of Fain Drilling Company of Oklahoma City, for a consideration reported to be in the neighborhood of $500,000. Assets include 10 heavy-duty drilling rigs, four of which are in Wyoming, five on the Texas Gulf Coast and one in Carter County, Oklahoma, as well as a fleet of trucks and cars and other drilling equipment.

Barnsdall Oil Company has set up a new drilling department with George Noland, formerly in the materials division of the company, as superintendent. Contracts on which rigs are drilling will be fulfilled after which Barnsdall Oil Company and Sohio Oil Company plan to use the tools to drill their own wells.

Lend-Lease Petroleum Approaches Billion Mark

Lend-lease exports of petroleum products, not including production and refining machinery and equipment, reached a total of $919,000,000 between March 11, 1941, and May 31, 1944, it was reported July 25 by Foreign Economic Administrator Leo T. Crowley.

Oil shipments, it was shown, accounted for approximately 4.5 percent of total lend-lease exports of $20,525,000,000 reported by Crowley.

More than two-thirds of the total value of oil shipments, $661,000,000, went to the United Kingdom. Oil products to the value of $38,000,000 went to Soviet Russia, while shipments to Africa, the Middle East and the Mediterranean Area were reported as $63,000,000; China, India, Australia and New Zealand, $149,000,000, and other countries $8,000,000.

IPAA Directors Will Meet at Dallas in October

A meeting of the board of directors of the Independent Petroleum Association of America will be held at Dallas, October 9, 10, and 11, it was announced following the meeting of the association's executive committee and vice presidents at Fort Worth, July 26.

The directors' meeting will take the place of the fifteenth anniversary membership meeting scheduled at Dallas on October 23, 24, and 25.

This change in meetings was in compliance with the request of the Office of Defense Transportation. The ODT request is based on the necessity of making quickly available the transportation facilities of the nation to bring the wounded from the battle-fronts to hospitals in this country.

"The oil industry is an essential war industry," Ralph T. Zook, president, declared. "The association represents thousands of oil producers throughout the United States. However, it was our feeling that we should do everything possible to relieve the congested travel conditions."

Easing of Demand Indicated As Refined Oils Accumulate, With Production Down

Some easing of the recent abnormally great demand for petroleum products was indicated in statistics for the week ended July 29. Stocks of all major products increased in the face of somewhat lower production of each, with less crude charged to stills than in the previous week. Production of crude was slightly lower also. Stocks of crude probably were drawn upon less than heretofore, in view of the lower runs to stills, although a draft of over a million barrels from crude storage was reported for the week ended July 22.

U. S. crude production at 4,608,000 barrels daily in the week of July 29 was only 7000 under the all-time peak of the previous week and was 475,000 barrels a day or 11.5 percent higher than in the corresponding week last year. The crude output is due to go still higher for the week of August 5, under new monthly proration schedules.

Crude runs to stills averaged 4,627,000 barrels a day in the week of July 29, or 19,000 a day more than domestic production, indicating a possible further draft on stocks, as imports may not have exceeded losses of crude in handling and use of crude for fuel. In the preceding week crude stocks were drawn down 178,000 barrels daily (1,219,000 for the 7 days), with runs to stills 69,000 barrels a day above domestic production. At the new rate, the refinery runs of crude were 839,000 barrels a day or 22.1 percent higher than those of 3,788,000 daily in the week ended July 31 last year. Crude stocks on July 15 this year totaled only 225,294,000 barrels, a new low for 22½ years, or since January, 1922.

Gasoline production averaged 2,164,000 barrels daily in the week of July 29, including natural blended at refineries. That was 18,000 a day less than in the previous week but 429,000 daily or 27 percent more than production in the final week of July last year. Stocks of gasoline (finished and unfinished) were increased at the rate of 73,000 barrels daily, having climbed to 82,665,000 barrels, and they then were 7,688,000 barrels or 10 percent higher than on the corresponding date a year before.

Gas oil and distillate fuel production was down 34,000 barrels daily from the previous week in averaging 690,000 daily. That was 152,000 a day or 28 percent more than production a year earlier. Stocks accumulated at the rate of 90,000 barrels daily and at the end of the week stood at 38,135,000 barrels, up 1,772,000 barrels or 5 percent from the level a year previously.

Residual fuel oil production was 7000 barrels a day down, having averaged 1,270,000 barrels daily, or 60,000 a day (5 percent) more than in the corresponding week last year. Stocks were increased 138,000 barrels daily and then totaled 56,280,000 barrels, an amount 10,597,000 barrels or 16 percent less than the 66,877,000 barrels reported for July 31 last year.

Kansas Oil Allowable For August Unchanged

Kansas crude oil allowables for August have been set at 275,000 barrels daily by the Kansas State Corporation Commission, unchanged from the figure set for July.

The commission allotted the Hugoton field 6,685,228,000 cubic feet of gas during August. Cunningham in Kingman and Pratt Counties was allotted 627,000,000 cubic feet, and Otis in Rush and Barton Counties, 1,327,552,000 cubic feet.

Texas Permits to Drill Again Over 200 in Week

Permits to drill 211 new wells in Texas were approved by the Railroad Commission last week. This is the first time since late in 1941 that the number has exceeded 200.

There were 57 locations in West Texas and 54 in Southwest Texas. North Texas reported 29 locations. There were 26 in West Texas and 22 in the Gulf Coast. The Panhandle reported 17 locations and there were 6 from East Central Texas.

Yates Allowed 42,432 Barrels—and Every Day

The Texas Railroad Commission has revised its allowable order for the Yates field, Pecos County. Effective August 1, the allowable was fixed at 42,432 barrels daily, and the field is exempt from shut downs.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	49,861	11-14	95,857	1- 3
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	46,187	11-27	72,881	1- 2
1944	[1]4,615	7-22	[1]4,752	6-17	240,992	1- 1	89,162	4- 1	42,310	1- 1	57,330	1- 1
Lows:												
1939	[2]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	[4]225,294	7- 8	76,302	1- 1	30,232	4-29	49,737	3-18

TRENDS OF 1943 AND 1944

Trends in Week Ended:	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,683	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 24	3,913	3,737	242,035	10,583	91,001	3,954	31,142	8,168	67,455
May 29	3,970	3,679	245,752	10,656	83,937	3,798	32,274	7,672	67,682
June 26	3,955	4,015	242,657	11,092	79,589	3,876	34,044	8,126	67,960
July 31	4,133	3,788	238,420	11,127	74,977	3,765	36,363	8,478	66,877
August 28	4,196	4,227	236,170	12,420	72,525	4,351	37,928	8,732	67,250
September 25	3,344	4,156	233,013	12,206	70,024	4,608	40,328	8,560	66,659
October 30	4,383	4,176	237,219	12,813	69,297	4,642	44,591	7,968	63,833
November 27	4,414	4,261	239,761	12,638	69,980	4,379	46,187	8,633	62,143
December 25	4,363	4,185	241,310	12,597	74,024	4,457	43,791	8,689	57,596
1944:									
January 1	4,357	4,453	240,992	13,192	76,302	4,575	42,310	9,141	57,330
January 29	4,409	4,359	240,251	13,427	81,085	4,054	37,266	8,889	52,857
February 26	4,423	4,377	237,137	13,183	85,248	4,558	33,766	8,952	51,387
March 25	4,385	4,443	236,285	13,362	87,287	4,979	31,319	9,013	51,669
April 1	4,383	4,435	234,667	13,824	89,162	4,450	30,530	8,367	51,326
April 29	4,431	4,300	235,342	13,126	88,462	4,284	30,236	8,398	49,985
May 27	4,514	4,532	234,423	13,502	86,468	4,702	32,035	8,568	49,812
June 3	4,523	4,620	234,476	13,680	87,084	4,890	32,586	9,157	50,283
June 10	4,523	4,670	231,290	14,220	86,911	4,996	33,669	9,008	51,221
June 17	4,568	[1]4,752	230,565	14,398	85,268	4,870	34,137	9,489	52,017
June 24	4,583	4,638	229,332	14,066	86,000	4,337	34,328	8,961	52,757
July 1	4,587	4,638	228,860	14,052	83,559	4,496	35,360	8,872	52,235
July 8	4,579	4,645	[4]226,424	13,539	83,709	4,548	36,189	9,009	53,686
July 15	4,602	4,575	226,513	14,083	82,252	4,842	37,171	8,587	54,332
July 22	[1]4,615	4,684	[4]225,294	14,243	82,150	5,073	37,513	8,947	55,315
July 29, 1944	**4,608**	**4,627**	.....	**14,115**	**82,665**	**4,833**	**38,135**	**8,900**	**56,280**
July 31, 1943	4,133	3,788	[5]237,279	11,127	74,977	3,765	36,363	8,478	66,877
Change:									
In week	—7	—47	—1,219	—128	+515	—240	+622	—47	+965
In year	+475	+839	—11,985	+2,988	+7,688	+1,068	+1,772	+422	—10,597
In year	+11.5%	+22.1%	—5.1%	+26.9%	+10.3%	+28.4%	+4.9%	+5.0%	+15.8%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922 due to shutdown of six Mid-Continent states. [4] Lowest since January, 1922. [5] Stocks, July 24, 1943.

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

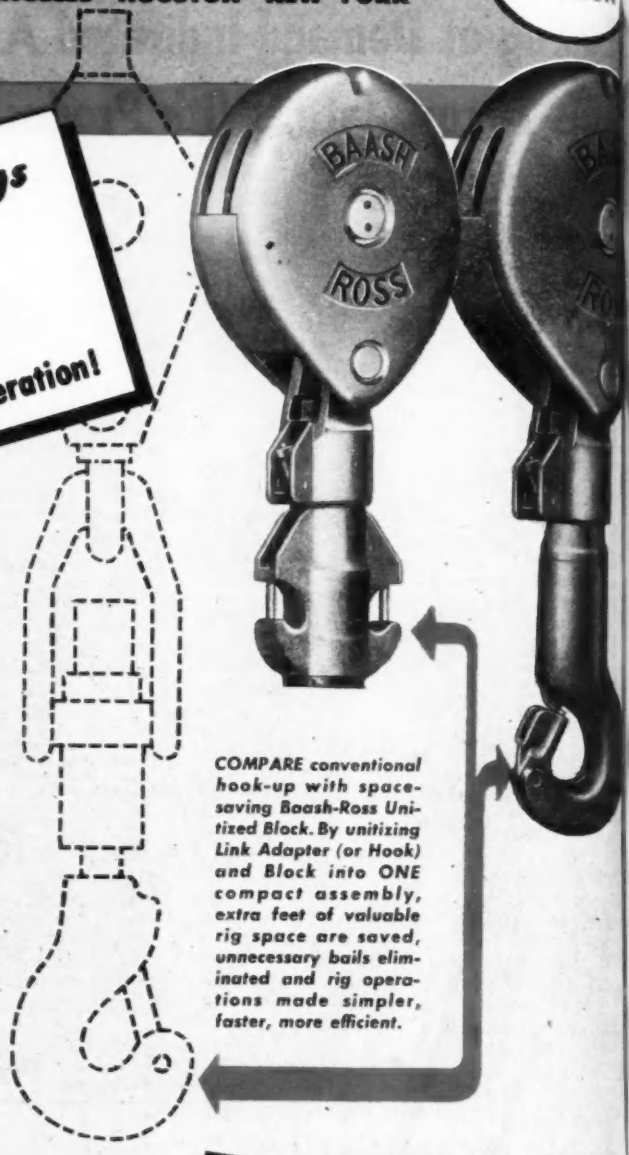
OIL WEEKLY EDITION

Add more working room to portable rigs with BAASH-ROSS UNITIZED BLOCKS

Faster Trips! Safer Work! Simplified Operation!

In portable rigs, maximum compactness is absolutely vital and every foot saved in the hook-up between blocks and pipe adds that much space to the working height of the derrick. That's why you can't get maximum speed and efficiency from portable rigs by using a standard rig hook-up between elevators and traveling block.

And there's no need to, for *Baash-Ross Unitized Blocks* provide every operating feature found in the standard block-plus-hook-plus-elevators hook-up . . . *and in addition give a compactness, simplicity and efficiency far superior to conventional arrangements!*



***COMPARE** conventional hook-up with space-saving Baash-Ross Unitized Block. By unitizing Link Adapter (or Hook) and Block into ONE compact assembly, extra feet of valuable rig space are saved, unnecessary bails eliminated and rig operations made simpler, faster, more efficient.*

Check these Advantages

MANY UNIQUE FEATURES!

Link Adapter (or Hook) is spring-loaded and freely swivels through full 360° rotation. And a convenient built-in lock, with choice of eight equally-spaced positions, locks unit against rotation. Sheaves rotate on heavy duty roller bearings, easily lubricated through individual grease ducts. Main frame and side plates are one rugged integral casting, and all bolts, pins, grease fittings, etc. are completely recessed to prevent "hanging up" on rig obstructions. *These are only a few of many outstanding design features!*

TWO TYPES—ELEVEN SIZES!

There's a size and type Baash-Ross Unitized Block for every job, whether for portable drilling work or standard production work.

Two types—*Block with Link Adapter* or *Block with Hook* (The Link Adapter unit gives maximum compactness). Each type is available in 1, 2 or 3 sheave models (30, 65 or 100 ton capacities) with choice of 20", 24" or 30" sheaves . . . and 4 sheave models (150 ton capacities) with 30" or 36" sheaves. There's a size to meet your requirement!

MAXIMUM COMPACTNESS!

Compare above the space-saving advantages of Baash-Ross Unitized Blocks over conventional arrangement. Block and Link Adapter (or Hook, if preferred) are one unit, eliminating space wasted by usual bails.

The extra feet of space thus saved enables your crews to make faster trips without risk of hitting crown. It gives more working space at floor. And it frequently permits use of longer pipe lengths, saving additional time and work.

GET THE COMPLETE STORY on these Blocks from your nearby Baash-Ross representative . . . or write direct for special bulletin. *Also ask about the Baash-Ross Unitized Crown Block specially designed for portable rigs!*

U. S. Field Operations

Oklahoma

Payne County Show Indicates New Field

A new oil field loomed for Payne County as Frank Russell's Young 1, SW NW NE 9-19n-1w, readied for production test after recovering considerable oil on drill-stem test of Misener sand at 4865-77 feet. Drilled to 5065 feet with the second Wilcox dry, it was plugged back and pipe set at 4855 feet. Location is two miles northeast of the Orlando field. In the Ingalls area, Deep Rock Oil Corporation's Kimmel 1, SWc NW 10-19n-5e, reported oil shows from 3270 to 3292 feet and is rigging up to drill deeper.

Grady County: Olson Oil Company is drilling below 2755 feet in Pfile 1, SW NE NE 32-3n-7w, after recovering 33 feet of oil and 30 feet of mud on a 45-minute drill-stem test at 2706-30 feet. The wildcat is two miles north of Marlow community. Showing was in basal Pennsylvanian.

Creek County: Deep Rock Oil Corporation's Castle 1, SE NW SE 16-15n-7e, wildcat near the small Milfay pool, swabbed 25 barrels of oil from Wilcox at 3864-3906 feet following 60-quart shot and was cleaning out preparing to drill deeper.

Washita County: Gulf Oil Corporation's Hare 1, NE SW 8-8n-20w, which has been testing in granite wash for a couple of months, flowed 65 barrels of oil and 80 barrels of water from five perforated intervals between 5840 and 6060 feet. Originally drilled to 6608 feet, hole was plugged back. Testing continues. The company's Shields 1, SE NW SE 11-8n-20w, three miles east of the Hare well, is drilling below 6690 feet after logging 5,000,000 feet of gas in the wash zone.

West Moore: Mid-Continent Petroleum Corporation's Mullins 1, NE SW SW 29-10n-3w, Cleveland County, completed in second Wilcox through perforations at 8768-75 and 8790-8817 feet, flowing 300 barrels daily through 22/64-inch choke, with 2350 pounds tubing and 1000 pounds casing pressures. It is a 40-acre location west of the discovery well. Sinclair Prairie Oil Company's Theimer 1, NE SE SW of 20, which logged dry second Wilcox, reported stains and odor in the McLish at 9036-90 feet, and is drilling below 9260 feet. Margay Oil Corporation's Garlinghouse 1, NE NW NW 33-10n-3w, also dry in second Wilcox, is shut down at 8925 feet.

West Edmond: Sohio Petroleum Company's Waller 1, CNE SE 24-14n-5w, Canadian County, flowed 520 barrels of oil in four hours through tubing choke and then was pinched to 200 barrels daily. Hunton lime was topped at 6992 feet with Bois d'Arc based at 7066 feet and oil string set at 7150 feet, total depth. Another eastern extension of the area, which now has more than 100 producers, seems assured as Denver Producing & Refining Company's Sitlington 1, CNW NW 10-13n-4w, Oklahoma County, set pipe and was preparing for test after logging saturated Bois d'Arc at 6650-93 feet. The test checks 158 feet higher on the base of the Bois d'Arc than Anderson-Prichard Oil Corporation's Crookham 1 in Section 9, nearest producer. Gulf Oil Corporation was preparing to wash in Christner 1, SW SE 7-14n-4w, after running pipe to 7000 feet, total depth. Saturated Hunton lime was logged from 6866-6924 feet.

West Edmond has its 100th producer with completion of Magnolia Petroleum Company's Lynch 2, CSW SW 4-13n-4w, flowing 100 barrels of oil an hour, pinched in to the field's allowable of 200 barrels daily. The field is not yet a year old and has been extended into Canadian and Logan Counties from Oklahoma County.The field is more than nine miles long and three miles wide and still going north with possibilities it may extend into Kingfisher County.

Stephens County: In the Doyle area, Magnolia Petroleum Company's Ashlintubbi 1, NE NW 11-1n-5w, continues testing after swabbing 40 barrels of oil in 18 hours at plug-back depth of 6723 feet. Phillips Petroleum Company abandoned Quinn 5, SW NW SE 23-1s-5w, at 1661 feet, after drill-stem test from 1631-60 feet recovered mud and salt water. Pace et al's Suckky 1, SE SW NW 26-2s-7w, abandoned at 1910 feet.

Efforts to control Rigney 4, wild gasser drilled by Little Nick Oil Company in the east sector of the Cement pool of Caddo County, have proved unsuccessful and the well continues to blow 50,000,000 cubic feet of gas daily.

Kansas

Kiowa County Wildcat Reports Oil Indications

Lion Oil Refining Company's Allford 1, SEc SW 14-30s-14w, Kiowa County, reported strong odor and stains in a Mississippi lime core at 5086-90 feet. Lansing was topped at 4402 feet with top of the Mississippi lime reported at 5040 feet. Coring continues below 5100 feet.

McPherson County: Operators in the Lindsborg pool have their eye on recent discoveries in the lower or crystalline Viola and several are reported ready to deepen to that zone following completion of Bay Petroleum Company's Farmers Bank 1, NW SW 17-17s-3w, which flowed better than 25 barrels of oil in 24 hours from the crystalline section at 3390-91 feet. Pool production is in the upper Viola and the new pay is about 50 feet lower.

Finney County: Carter Oil Company's Miller 1, NEc SW 26-22s-34w, near the Hugoton gas pool, is waiting on cement at 2800 feet, plug-back depth, for a second test in the Ft. Riley zone. A previous test in the zone at 2830 feet recovered nearly a million feet of gas and some water.

Pratt County: Stains and odors are reported in Hatfield et al's Lemon 1, NWc 33-27s-13w, wildcat three miles

Wells Completed in the United States in Week Ended August 5, 1944

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	1	17	2
Arizona	....	....	....	....	....	....	....	....	....	....	....	3	6	....
Arkansas	1	....	....	1	2	....	....	....	....	....	2	14	128	154
California	37	1	....	....	38	3	....	....	12	12	53	42	1,207	811
Colorado	....	....	....	....	....	....	....	....	....	....	....	1	14	14
Florida	....	....	....	....	....	....	....	....	....	....	....	....	1	....
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	2	2
Illinois	17	....	....	9	26	1	3	....	10	13	40	54	1,060	1,050
Indiana	2	....	....	1	3	....	....	....	3	3	6	7	160	145
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Kansas	18	....	1	7	26	....	2	....	9	11	37	48	1,067	963
Kentucky	3	....	....	2	5	....	....	....	2	2	7	17	422	188
Louisiana	5	....	....	2	7	....	2	....	....	2	9	27	437	368
North Louisiana	....	....	....	....	....	....	....	....	....	....	....	16	148	161
South Louisiana	5	....	....	2	7	....	2	....	....	2	9	11	289	207
Michigan	3	....	....	3	6	....	....	....	2	2	8	17	381	312
Mississippi	....	....	....	....	....	....	....	....	2	2	2	12	104	54
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	13	15
Montana	....	....	....	....	....	....	....	....	....	....	....	4	181	134
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	7	29
New Mexico	1	....	....	....	1	....	....	1	....	1	2	7	237	144
New York	15	....	10	....	25	....	....	....	....	....	25	25	763	690
Ohio	3	6	....	5	14	....	....	....	....	....	14	14	486	524
Oklahoma	6	2	....	17	25	....	1	1	4	6	31	57	1,048	760
Pennsylvania	27	....	15	....	42	....	....	....	....	....	42	52	1,619	1,460
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	7	5
Texas	47	4	....	15	66	1	4	1	29	34	101	131	3,516	2,321
E.Tex.Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	....	13	16
E. Texas Field	....	....	....	....	....	....	1	....	....	1	1	....	4	5
Rest of E. Texas	....	....	....	....	....	....	....	....	....	....	....	6	174	129
North Texas	35	....	....	5	40	....	....	....	8	8	48	39	843	556
W. Central Tex.	....	....	....	....	....	....	....	....	....	....	....	....	225	207
West Texas	....	....	....	....	....	....	1	....	8	9	9	37	907	512
Tex. Panhandle	....	....	....	....	....	....	....	....	....	....	....	10	144	119
G. Coast, Upper	5	2	....	3	10	....	1	....	4	5	15	7	331	179
G. Coast, Lower	4	2	....	6	12	1	....	1	6	7	20	26	556	350
Southwest Texas	3	....	....	1	4	....	1	....	1	2	6	5	260	213
S. Central Tex.	....	....	....	....	....	....	....	....	2	2	2	1	59	35
West Virginia	....	....	....	....	....	....	....	....	....	....	....	14	522	356
Wyoming	....	....	....	....	....	....	....	....	....	....	....	4	90	69
Total U. S.	185	13	26	62	286	5	12	3	73	88	379	551	13,497	10,573

* Includes distillate wells. † Includes salt water disposal wells.

southwest of the Iuka pool. Lansing was topped at 3835 feet with showings reported in a core at 4003-06 feet. It is drilling below 4050 feet. Derby Oil Company's Ryno 1, NE NW NW 6-19s-1w, a Jenday pool outpost test, is drilling below 3020 feet after topping chat at 2959 feet.

Sedgwick County: Half a mile south of the abandoned Cheney pool, W. D. Moore et al are rigging up on Ehlert 1, SEc 7-27s-4w, on an 800-acre lease and plan to test Arbuckle.

A. H. (BURT) LLOYD has been appointed division land man for Sinclair-Prairie Oil Company and Sinclair-Wyoming Oil Company at Evansville, Indiana. He succeeds John E. Watson, who resigned to join British American Oil Producing Company.

California

New Sand Productive In Old Torrance Area

The opening of what appears to be a new sand for the old Torrance field, Los Angeles Basin, for the time being has eclipsed in interest all other current California exploration activities. George D. Nordenholt's Rico 3, near the corner of Susana and Ruby Streets was drilled at a location with old wells all around it, mostly producers reduced to stripper classification by long decline. Consequently, it was a little short of amazing when, while preparations were being made to complete on the pump, the well blew in with an initial flow estimated at 1200 barrels daily rate. Placed under control, it flowed through 18/64-inch choke, 250 barrels daily of clean 25.6-gravity oil and 175,000 cubic feet of gas, with pressures of 340/660 pounds. Aggregate of sands open to production is 570 feet. Explanation offered as to how such a find was possible in a closely drilled part of an old field is that original developers of Torrance drilled to the single horizon known at that time, and ignored possibilities of other horizons.

Wildcatting proper in California uncovered few shows of possible importance last week. In fact, the period witnessed unsuccessful finishes for 12 tests in 8 counties.

Kern County: Standard Oil Company's unsuccessful attempt to extend the westward limits of its recently discovered Section 27 pool appears to have been compensated by production in the Calitroleum sand, an upper horizon tested after abandoning the lower part of the hole. The test flowed 550 barrels daily of 27-gravity clean oil, through 20/64-inch choke, with 450 pounds tubing pressure.

Los Angeles County: Barnsdall Oil Company is drilling on an 11,000-foot test, below known producing horizons of the Newhall-Potrero field. British American Oil Producing Company and The Texas Company have staked a wildcat in Section 21-4-17, one mile south of Del Valle field. Standard Oil Company is moving in for a test below 10,000 feet, in Section 1-3-17, on the Pico Anticline.

Orange County: General Petroleum Corporation's Buena Park wildcat is running more than 11,000 feet of casing for a production test. The hole was bottomed in Volcanics, topped at 11,135 feet, the upper part of which carried oil and gas shows. For the production test the hole was plugged back to 11,200 feet.

Richfield Oil Corporation has announced a new wildcat play centering around Section 8-4-9, in the northeast corner of which a test will be started immediately. The location is one mile south of Olive.

Illinois Basin

Three New Pools Found in Illinois, One in Indiana

Cameron Oil Company is opening a new pool in Jefferson County with Bizote 1, NW NE NW 20-1s-2e, six miles northeast of The Texas Company's recent discovery, Kasban 1. The well has pipe set to test Bethel sand at 2050-65 feet. A drill-stem test at 2040-65 feet showed 500 feet of oil in 40 minutes. The Texas Company's well, SE SE NW 8-2s-1e, swabbed 135 barrels of oil from Rosiclare sand after plug was drilled at 2110 feet.

Richland County: Philipps Petroleum Company is preparing to test Rosiclare sand at Jennings 1, NE NE SE 6-2n-10e, a pool opener six miles east of the Schnell pool. Pipe was set at 3145-50 feet after a drill-stem test at 3145-52 feet, yielded 250 feet of oil in one hour.

Hamilton County: National Associated Petroleum Company's Vada Johnson 2, NE NW SE 10-5s-7e, is a new Aux Vases sand discovery three miles south of the Bungay pool. The well swabbed 7 barrels of oil per hour from Aux Vases sand at 3385-3400 feet. Vada Johnson 1, nearby, made some

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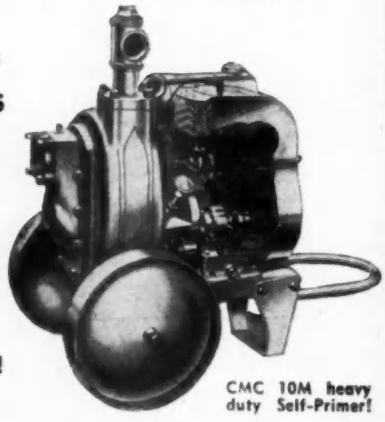

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oil from Cypress sand and showed for a producer until difficulty was encountered with pipe and it was temporarily abandoned.

Douglas County: Ohio Oil Company's Shaw 1, SW SW SW 36-16n-8e, is drilling below 1000 feet with heavy cable tools. The well is slated to test horizons as deep as 5000 to 6000 feet in an area which has had few tests, and those shallow.

Gallatin County: Swan and Leach's Goforth 1, SE SE SW 27-7s-10e, a Tar Springs sand pool opener two miles southeast of New Haven, is pumping 200 barrels of oil daily from 1992 feet. Mechanical trouble with pumping unit has prevented an accurate gauge on the production. Well was given a 40-quart shot.

Richland County: Pure Oil Company has set pipe to test McClosky lime at Moore 1, SE SE NW 13-4n-9e, a wildcat in Denver township, an area that has had no exploration for several years.

Indiana

Cherry and Kidd' Baird 1, SW SW NE 25-3s-12w, Gibson County, Indiana, a discovery in McClosky lime at 2515-20 feet, pumped 130 barrels of oil in 24 hours after 1000 gallons of acid.

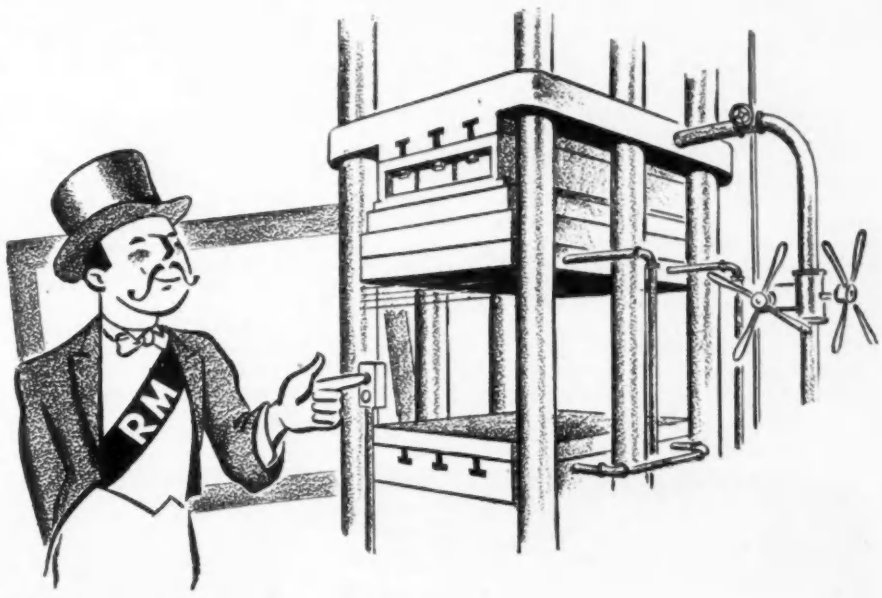
In Posey County, in the South New Harmony pool, Central Pipe Line Company has a new pay horizon at Rutledge 2, SW SW NE 14-5s-14w. Pay was recovered in Devonia sand at 1915-25 feet and the well pumped 154 barrels in 24 hours. Other production in the pool is from Hardinsburg sand.

West Texas

Pecos County Wildcat Has Unusually Wet Gas Flow

Standard Oil Company of Texas' Mac-Der Company 1, Lease 3, Pecos County wildcat, 3 1/3 miles east by south of the Mac-Der 2-well high-pressure gas pool, tested at rate of 5,780,000 feet of gas with 700 barrels of distillate and 122 barrels of natural gasoline on small choke after using 3000 gallons of acid through perforations at 4902-60 feet. An extended production test has been delayed due to the well blowing tubing from the hole to cause fatal injuries to three members of the drilling crew and damage to the rig. Additional perforations will be made in the upper zone, which is tentatively identified as the Wolfcamp, or basal Permian. This unusually wet gasser was drilled to granite at 5373-74½ feet with an elevation of 3002 feet, and was considered a failure until electrical formation survey revealed production possibilities near the 4900-foot level.

The company discovered the Mac-Der pool with a flow of 10,900,000 feet of gas through 9/16-inch choke with 1350 pounds casing pressure after perforating Wolfcamp at 4706-30 feet. Humble Oil & Refining Company's Smith 1, north offset, gauged 13,300,000 feet of gas on ½-inch from perforations at 4723-33 feet. The former entered granite at 5280 feet and the latter at 5235 feet, while the Ordovician section is absent. Failure of these first two wells to yield oil caused interest in the area to subside, but the appearance of extremely wet gas in the east strike will induce lease owners to explore the entire structure even though no im-



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mediate market is available for the gas.

Humble Oil & Refining Company's Word 1, 14 miles west of the Mac-Der pool, was drilling shale at 8555 feet, with top of Wolfcamp tentatively called at 7250 feet with elevation of 2785 feet.

Howard County: John B. Hawley Jr. and Northern Ordnance's Spaulding 1, prospective Clear Fork (Wichita-Albany) strike for the northwestern part of the county, was drilling at 5295 feet. Drill-stem test at 5100-91 feet yielded 780 feet of gas-cut mud. Top of Wichita-Albany was called at 5175 feet with elevation of 2651 feet.

Lubbock County: Ordovician and Clear Fork tests are scheduled for geophysical prospects in this county, which has acocunted for two one-well oil pools. Magnolia Petroleum Company's Johnson 1, C NE NE Section 88, Block C, 6 miles northeast of the Stennett pool and near the east edge of county, will drill to Ellenburger, or 8000 feet. Seaboard Oil Company's Cravens 1, C SW SW L&SV 16, Block D, 4½ miles south by west of Abernathy, is contracted to 6000 feet.

Ector County: Shell Oil Company-Cities Service Oil Company's T. P. Land Trust 1, 4 miles northeast of the Wheeler-Ellenburger field and an Ellenburger project, recovered 55 feet of gas-cut mud when tester was used at 6990-7050 feet, and was drilling lime at 7140 feet.

Wheeler-Ellenburger Field: Superior Oil Company of California's Wheeler 1, north offset to the discovery well for the four-well area, had failed to reach the Ellenburger in coring to 10,655 feet, being 152 feet low. It is becoming apparent that an irregular pay level is typical for the area. Stanolind Oil & Gas Company-Shell Oil Company's Wheeler 1-C, 3/4 mile northwest outpost, entered Devonian chert at 8350 feet for favorable structural position, and was drilling chert at 8410 feet.

Keystone Deep: Gulf Oil Corporation's Keystone 46-E, mile southeast extension for the Ellenburger area, promises to establish a new record pay thickness before reaching granite, and was drilling broken pay dolomite at 9986 feet, or 736 feet in the Ellenburger, including the top 286-foot gas-distillate zone. Drill-stem test at 9937-67 feet recorded a flow of oil, gas and rotary mud.

Andrews County: Union Oil Company and Helmerich & Payne's Redus 1-B, 1 2/3 miles southwest of the Union field, swabbed 4 barrels of oil hourly after using 4000 gallons of acid in broken Wichita-Albany saturation at 6830-7415 feet. Additional acid treatments will likely develop steady flow. This is the first important extension other than along the production strike to the southeast toward the Fullerton field. Union Oil Company's Biles 6, 1½ miles northwest outpost, set pipe after drilling through pay to 7460 feet. Nominal porosity and oil stain was logged at 7030-40 and 7070-95 feet, while formation softened at 7096-7109 feet. In the Fullerton field, Mid-Continent Petroleum Corporation's University 1-7, south outpost that failed in the Clear Fork but showed for a producer in the Wolfcamp, cemented protection string of 7-inch at 8941 feet to explore the Ordovician.

Crane County: The Texas Company's Hobbs 1-B, southwest offset to its Crossett pool Devonian discovery, swabbed and flowed 34 barrels in 22 hours, then responded to treatment with 2000 gallons of acid by swabbing and flowing 101 barrels of oil in 7 hours. Production is from broken saturation in lime and chert at 5331-91 feet, having entered Devonian at 5325 feet. The company's discovery is awaiting completion gauge from perforations at 5300-50 and 5365-90 feet, and is the first Devonian producer for the state.

Texas Hearings

Hearings have been scheduled by the Texas Railroad Commission, August 8 to consider operating rules for the new Hardy field in Jones County, and proposed revision in the casing rules for the New Hope field, Franklin County.

On August 9, operating rules for the Cistern field in Fayette County, and the area surrounding Phillips Petroleum Company's 1 in Smith County, will be discussed. Another hearing will involve the application of Standard Oil Company of Texas for an allowable increase for the Smith Point field in Chambers County.

New rules for the Funk field in Tom Green County will be considered at a hearing on August 10, and the application of Sun Oil Company will be heard for amendment of rules for the Navarro Crossing field, Houston County, so that the gas market in the field may be distributed on a more equitable basis.

Rules for the Henderson field, Rusk County, will be proposed at a hearing on August 11.

On August 17, the regular statewide proration hearing will be held.

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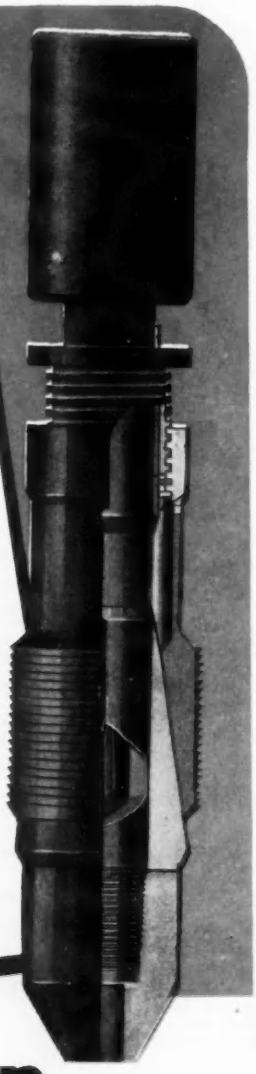

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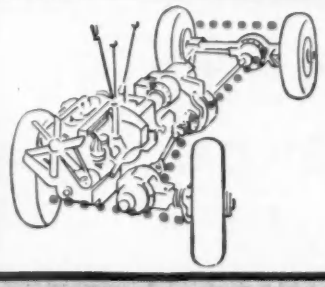

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North Texas

Young County Wildcat Has Favorable Showing

Standard Oil Company of Texas and Hanlon-Buchanan have scored another oil strike in southwestern Young County, based upon preliminary showing of their Dent 1, Section 2387, TE&L Survey, 2½ miles north by east of the Walsh pool. Dent 1 was running pipe to complete in Marble Falls sand at 4273-83 feet after drill-stem test recovered 445 feet of oil and 40 feet of oil-cut mud, with bottom-hole pressure calculated at 1750 pounds. Possible production in Bend saturation at 3755-80 feet was temporarily passed up. These discoveries generally embrace comparatively small producing areas.

Montague County: Continental Oil Company and Sinclair Prairie Oil Company's Hundley 1, a mile southwest of Mallard, established a new Bend conglomerate area in flowing 800 barrels of 41-gravity oil, gas-oil ratio 856/1, on potential test through ½-inch. Production is from perforations at 6228-35 feet. This strike is 1¾ miles north by east of production in the Denver area, which involves a higher structure. Hundley 1-A was drilling below 850 feet.

Young County: Standard Oil Company (Ohio) is starting a north and east offset to its Garvey 1, discovery that flowed 169 barrels of oil on 4-hour test through ¾-inch choke after using 1000 gallons of acid in Bend at 4463-85 feet. This strike is 3½ miles north by east of nearest deep production, and the company holds lease on a 1500-acre block. Champlin Refining Company holds acreage within the block and will drill Garvey 1, situated in the northeast corner of the section bearing the discovery.

Cooke County: Sinclair Prairie Oil Company's Kitchens 1, half-mile southeast of the Big Indian one-well pool, first producing area for the county, proved dry in the 3500-foot discovery pay, and tested 75 feet of salt water in sand showing oil saturation at 5357-65 feet. The Winger sand member of the Strawn series was topped at 5426 feet, and the test was drilling dry lime at 5497 feet.

Clay County: Continental Oil Company and Edge Oil Company's Crockett 1, Buffalo Springs prospect, shows promise of making a pumper from the Simpson, having swabbed 52 barrels of oil and 14 barrels of acid water after using 1000 gallons of acid through perforations at 6490-6500 feet. The fluid level rose 5000 feet in 2 hours after reperforating at 6503-13 feet. In the Wynn field, Sinclair Prairie Oil Company's Spikes 4, southwest outpost, registered sharp dip in structure in topping Mississippi at 6425 feet and Simpson at 6549 feet, and was making production test through perforations at 6410-65 feet. Shell Oil Company's Henderson 1-A, east offset to its Wynn pool discovery, also proved low in entering Bend at 5910 feet and Mississippi at 6438 feet, then plugged back from 6506 feet to try for completion in Bend conglomerate at 5960-76 feet.

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East Texas

Winnsboro Confirmation Test Running Higher

Gulf Oil Corporation's Hornbuckle 1, situated 2500 feet north of its Winnsboro pool discovery in Wood County, was showing favorable porosity and evidence of gas while coring at 8920 feet in Travis Peak after temporarily passing up promising production in the Rodessa series. This confirmation test is checking about 100 feet high. Gulf Refining Company is making preparations to enter the area with a pipe line extension from its Winnsboro station.

Bowie County: Barnsdall Oil Company and Sohio Petroleum Company's Heilborn 2, only Smackover lime producer in Texas, flowed 109 barrels of 40.3-gravity oil with gas-oil ratio of 8750/1 on 18-hour gauge through 3/16-inch choke. Flowing pressure on tubing was 2375 pounds. Production is from open hole below packer at 7703½ to 7716 feet, and the rise in gas-oil ratio and tubing pressure may be attributed to leakage from perforations at 7686-96 feet, where the well showed for a prolific gas-distillate producer. The owners plan to kill the flow to deepen about 10 feet, then set liner to complete through perforations in the oil zone. This discovery is on a 4000-acre block, and is 9½ miles south by west of a gas-distillate producer from the Smackover in Miller County, Arkansas.

Manziel Field: Amerada Petroleum Corporation's Noe 1, Wm. Barnhill survey and a northwest outpost, overstepped the structure in entering the Paluxy series at 6412 feet and abandoned at 6455 feet, 3 feet in the water sand. The company's Blackwell 1, G.

W. Smith survey, recorded potential of 443 barrels from perforations at 6300-14 and 6330-72 feet with estimated 44 feet of net oil sand. The Paluxy is virtually defined and only a few locations remain to be drilled, while the exploration of the lower pay has been disappointing. Amerada Petroleum Corporation et al's Hague 1, John Polk survey, was drilling dry sandy-lime at 8814 feet, having failed to indicate production to this level. Sun Oil Company's Johnston 1, same survey and lower structurally, was drilling at 8371 feet on an 8600-foot depth contract. Shell Oil Company's Herring-Scoggin 1 was testing after plugging back from 9297 feet to 8973 feet to set 5-inch at 8715 feet.

Smith County: Phillips Petroleum Company's McMinn 1, South Tyler field discovery, flowed 281 barrels of 45.8-gravity oil, gas-oil ratio 6040/1, on 10/64-inch choke with 4640 pounds working pressure on tubing for completion. Production is from Rodessa perforations at 9918-29 feet. The company has increased its scheduled development program to 4 tests, including a south outpost, and is installing a gathering system that will tie into Magnolia Pipe Line Company's trunk line. A major drilling campaign will be staged by the company if the followup tests prove satisfactory. The oil is low in octane content, but yields high-grade lube stock.

Camp County: Magnolia Petroleum Company's Florence 1, first well in the Pittsburg field to show water in the pay zone, has apparently excluded the water by sealing original perforations and re-testing at 8082-90 feet. The well flowed 36 barrels of oil on 5-hour test through drill pipe from these perforations.

Southwest Texas

Atascosa Wildcat Has Oil Show in Edwards

Humble Oil & Refining Company will probably open another Edwards lime field in Atascosa County. The company's Pruitt 3, Antonio Estrada Survey, 3 miles southwest of Charlotte, is reaming with total depth 6923 feet and likely will run casing for a production test. A 41-minute drill-stem test at 6919-23 feet, in the top of the Edwards lime, recovered 265 feet of clean oil and 45 feet of oil-cut mud, no salt water. Some reports indicate that the hole may be drilled to water level, but this is not confirmed.

In the Imogene field, Humble Oil & Refining Company's Duren & Richter 3 flowed at the rate of 89 barrels of 38.2-gravity oil daily from 7606 feet in the Edwards. Flow was through a 3/16-inch choke with tubing pressure 260 pounds.

McMullen County: Edwin M. Jones' Ezzell C-3, 2640 feet northwest of the discovery well in the San Caja field, has been disappointing, having failed to show enough to warrant a test of the Wilcox or Carrizo formations from which the discovery well produced, and has been abandoned after reaching 7229 feet. Jones is moving the rig immediately to location for Ezzell C-4, 2723 feet southwest of the discovery well, to continue the program of definition of the field's limits.

Bee County: Navarro Oil Company's Spielhagen 1, wildcat in the John Page Survey 2 miles northwest of Pettus, is coring below 7410 feet after having picked up sand showing gas odor at 7405-08 feet. No test has been made since one at 7179-97 feet when it showed gas and distillate-cut mud. Last week it recovered 180 feet of pipe-line oil on a partially successful drill-stem test at 7047-69 feet.

Slick Oil Company has made location for J. B. Copeland 1, new Wilcox sand wildcat 1½ miles southeast of the South Caesar field on a 332-acre lease in the Obid Marshall Survey. This test is being supported by other operators and will drill to 7500 feet.

San Patricio County: Republic's John Hancock 3, in the Taft field extension area, has reperforated casing at 4916-18 feet, and is making clean oil, preparing to run final potential test. On previous tests, with casing perforated at 4917-21 feet in the same sand, it showed salt water.

Northeast of production in the Gregory field, Humble Oil & Refining Company's Green 2 is drilling at 9458 feet in hard shale. This well recovered 300 feet of oil and 30 feet of mud on a drill-stem test at 8499-8505 feet, and could make a producer in that horizon.

Texas Gulf Coast

Deep Test at Stowell Finds Nothing Below Regular Level

Glenn McCarthy's Hankamer 4, deepest test for the Stowell field, Jefferson County, and now the deepest well to be drilled in Jefferson County, was drilling below 12,202 feet in shale at the close of the week, and according to best determination possible at the time, should be almost through the Frio and into the top of the Vicksburg formation. This well has already drilled the regular field pay from which it is assured production, and set a string of 7-inch casing at 9720 feet before going ahead to explore the entire Frio formation. Detailed information is not now available, but from present indications, the lower section failed to reveal anything of particular importance to the reserves of the area, and completion will probably be in the regular pay zone.

Fort Bend County: British American Oil Producing Company's Ed Hurta 1, southwest outpost to the Needville field in the southwestern part of the county, is still testing the upper sand, having failed to get a successful test on first perforations, made at 5201-08 feet, recovering salt water with some oil. These perforations are being squeezed off and next set made at 5190-5200 feet. While this well was being drilled a drill-stem test at 5187-5201 feet showed 500 feet of pipe-line oil. A new deeper pay had already been established by a test of perforations at 6547-52 feet where it flowed pipe-line oil at the rate of 5½ barrels hourly, but operators hope to make a dual completion, flowing from the new sand and from the 5200-foot regular pay.

Wharton County: Edwin Nielson's Winnie Poole 1, outpost ½-mile west of Salt Dome Oil Corporation's gas-distillate producer in the Lissie area, is standing cemented at 7205 feet in shale and sand, and will attempt completion in sands found above that depth. Electric log has indicated sands at 6890-6900 feet and at 7088-7104 feet with

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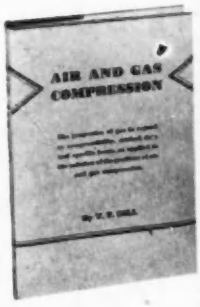

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showings, but no drill-stem tests were made.

Seaboard Oil Corporation's Rudolph Holub 1, in the El Campo area, has extended the field southeast, being dually completed in sand at 6820-24 feet and at 7588-92 feet. The well flowed 157.17 barrels daily from the upper set of perforations through a 1/8-inch choke with casing pressure 1100 pounds and gravity 38.9 degrees. Production from lower perforations was dry gas, no estimate made, tubing pressure 2225 pounds, shut-in.

Salt Dome Oil Corporation is making location for T. P. Jones 1, proposed 6000-foot Frio test 3 miles northwest of Louise in the western part of the county, in the S. P. Middleton Survey.

Hardin County: Critical depth is being reached in American Republics Corporation-Houston Oil Company's H&TC Fee 2, in the Beech Creek area, which is now drilling with a rock bit at 9287 feet. Top of the Wilcox has not been definitely picked, but has been tentatively placed at 9210 feet. Oil sand was cored in the Cockfield at 6240-45 feet.

D. D. Feldman has announced intention to drill Feldman Fee (Fountain) 7, as a deep test on the north flank at Saratoga, to be taken to 6000 feet.

Polk County: Shell Oil Company's Pratt 11, newest Wilcox sand producer in the Livingston field, flowed a potentiol of 148.35 barrels daily through ¼-inch choke with tubing pressure 225 pounds and casing pressure 1475 pounds, gas-oil ratio 450-1. Flow was from 7070 feet with 5½-inch casing at 7068 feet and a 3-foot perforated nipple on bottom of 2-inch tubing swung at 7030 feet. Top of Wilcox sand was 7065 feet.

On the north side of the field, Humble Oil & Refining Company's Sodak 2, testing the Sparta zone, is swabbing after perforating casing at 6069-76 feet. Total depth is 7696 feet. The same company's Granbury 33, in the southwest part of the field was perforating casing in the Wilcox zone with total depth at 7086 feet.

South Louisiana

Condensate Well Extends Vacherie Production West

Humble Oil & Refining Company's St. Joseph Planting 1, Section 12-12s-17e, has extended the Vacherie field, St. James Parish, 1800 feet west as a condensate producer. After drilling to 10,765 feet, casing was set at 9210 feet and perforated at 9126-36 feet. On short-time gauge it flowed at the rate of 2.92 barrels of condensate through a ¼-inch choke with tubing pressure 2300 pounds, gas-oil ratio approximately 27,000-1. Now shut in.

Humble Oil & Refining Company's Graugnaud 2, St. James area, northwest of Vacherie field, is drilling below 10,515 feet in shale.

Cameron Parish: Another new wildcat is in prospect for Cameron Parish, with arrangements completed for a new test on the Johnson Bayou prospect in the extreme southwest corner of the parish. Yegua Corporation and Continental Oil Company's Dobbertine 1 will be located in SE 9-15s-14w, and is being drilled on information supplied by recent geophysical work, the prospect having been re-worked since the last well was drilled by George Echols. Pickering Drilling Company, as contractors, will take the well to 10,500 feet.

Stanolind Oil & Gas Company has not yet started drilling its wildcat north of the Creole field on the Cameron Parish mainland.

In the southeast corner of the parish, Humble Oil & Refining Company's State-Rockefeller Preserve 1 is drilling below 10,492 feet in hard sandy shale after setting 9⅝-inch casing set at 9990 feet. An electric log to that depth failed to show anything.

Acadia Parish: Sun Oil Company et al have erected derrick for Mrs. C. H. Button 1, a new attempt to extend the Egan field southwest, being 4000 feet southwest of the nearest producer. Location is 3694 feet south and 795 feet west of the northeast corner of Section 1-10s-2w. The field was recently extended 1½ miles northeast with Freeland 1 which established the first oil production for this gas-condensate area.

Vermilion Parish: Union Oil Company's State-West White Lake A-2, more than ¾-mile northwest of the A-1 discovery well for this area, is standing cemented at 10,750 feet after setting 5½-inch casing. Casing setting and sand records are not yet available. The discovery well produced gas-condensate from 10,660-675 feet and gas from 8356-75 feet as a dual completion.

In the Freshwater Bayou area, Union Oil Company's Louisiana Furs C-3, Section 34-15s-2e, is drilling plugs from the 7⅝-inch casing set on bottom at 12,237 feet. This well logged a gas sand

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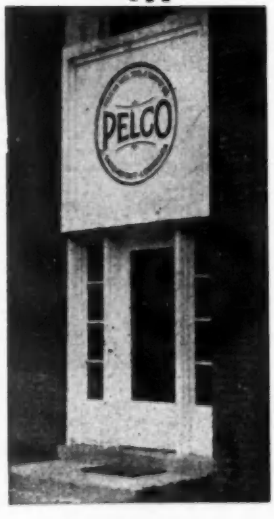

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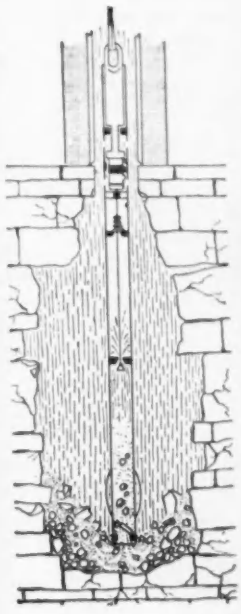

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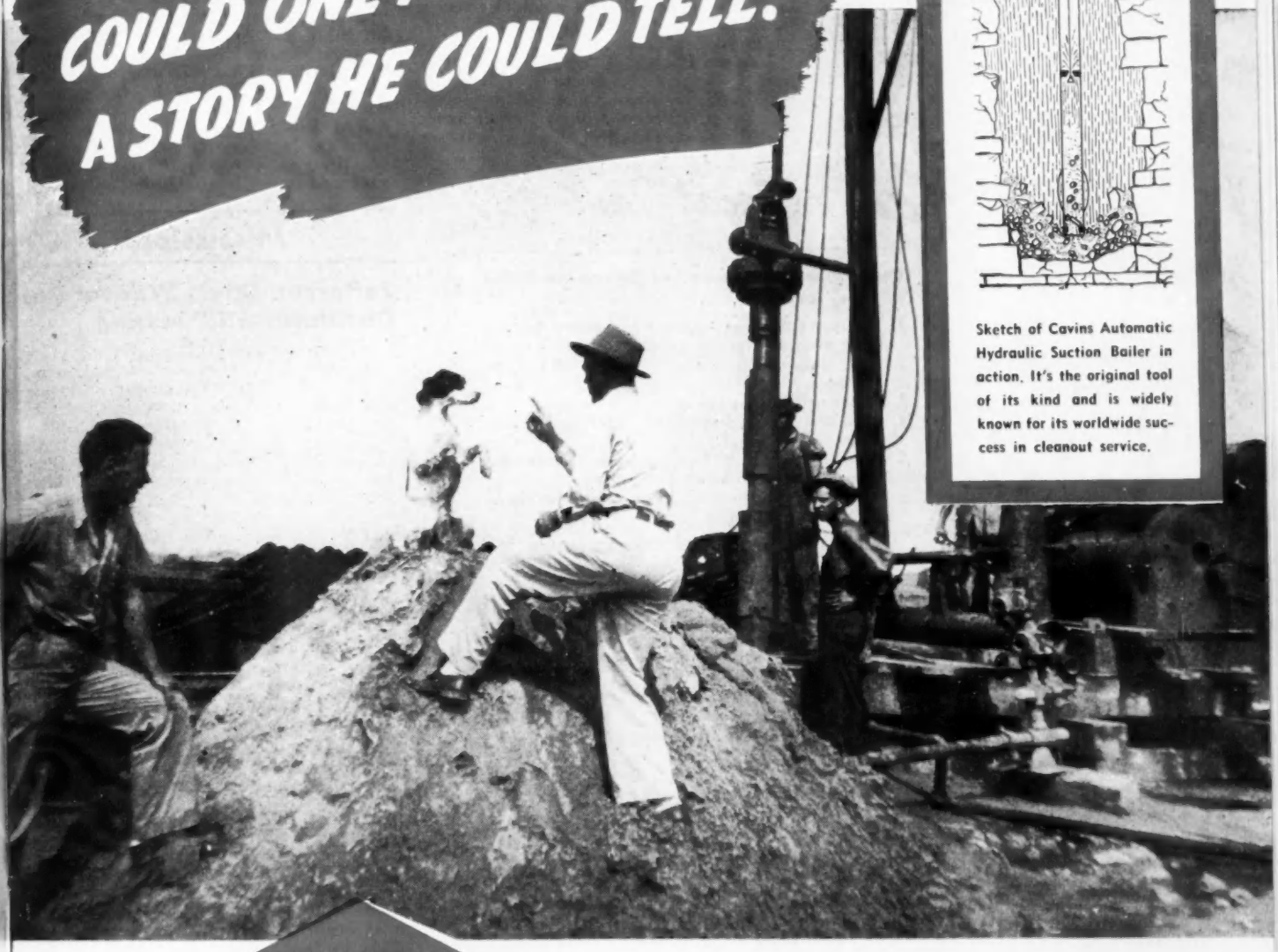

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at 11,487-588 feet which on electric survey that recorded 65 feet of effective gas sand.

In the East White Lake field, Union Oil Company's Louisiana Furs A-9 has been added to the list of producing wells with completion through perforations at 8450-8510 feet making 240 barrels of oil daily through 9/64-inch choke with gas-oil ratio 1554-1. Total depth is 8950 feet.

St. Landry Parish: Danciger Oil & Refining Company's Prejean 1, northwest outpost in the Cankton field area, is drilling below 8700 feet in shale with only another 1000 feet to go before entering the expected pay section. In the same field, Sun Oil Company has spudded Domingeaux 1 and is shut down with crew on vacation after setting conductor pipe.

North Louisiana

Webster Wildcat Still Drilling After Slight Shows

Carter Oil Company's Davis 1, Section 33-18n-8w, Webster Parish, is coring below 5772 feet after an attempted drill-stem test at 5714-53 feet failed when the packer did not hold. This well has had several showings of oil and gas in massive anhydrite topped at 4900 feet, but apparently did not find enough porosity to indicate commercial possibilities.

Lincoln Parish: The California Company's Norris 1, Section 15-18n-1w, which has already indicated commercial gas production from a higher sand, is drilling at 9470 feet. Casing was set at 9117 feet after testing the sand at 9055-74 feet.

Claiborne Parish: Gulf Refining Company and Houston Oil Company's Muslow 1, second deep test for the Homer Field, is drilling below 6071 feet after recovering salt water on a 5-minute drill stem test at 6041-61 feet. Showings of oil in a 1-foot streak of sand had previously been reported in a core at 6005-08 feet.

Concordia Parish: The California Company and Carter Oil Company's State 4-476 has added a new gas-condensate producer to the North Lake St. John field. It was completed through perforations at 9018-66 feet, total depth 9117 feet, making 175 barrels of distillate through 3/16-inch choke, along with 2,428,000 cubic feet of gas daily.

Red River Parish: The Texas Company has location for Semp Russ 1, 16-12n-10w, as a 6500-foot test south of gas production in the Bull Bayou field.

Mississippi

Jefferson Davis Wildcat Has Distillate; Still Testing

Sid Richardson's C. E. Berry 1, Section 24-9n-1w, Jefferson Davis County, which has indicated a commercial gasser, and has shown some distillate on the first test, is preparing to resume testing. With casing perforated at 8120-32 feet in Tuscaloosa, it was flowing gas at an estimated rate of 2,000,000 cubic feet daily through a small choke, when it started making some condensate. Shortly after the fluid production started, the flow lines became frozen, and cracked, making it necessary to shut down. In the meantime two high-pressure separators are being hooked up. At the time of the above gauge, while on a ⅛-inch choke, it showed tubing pressure of 3050 pounds and casing pressure 3100 pounds. Observers say the well is on a sizeable structure.

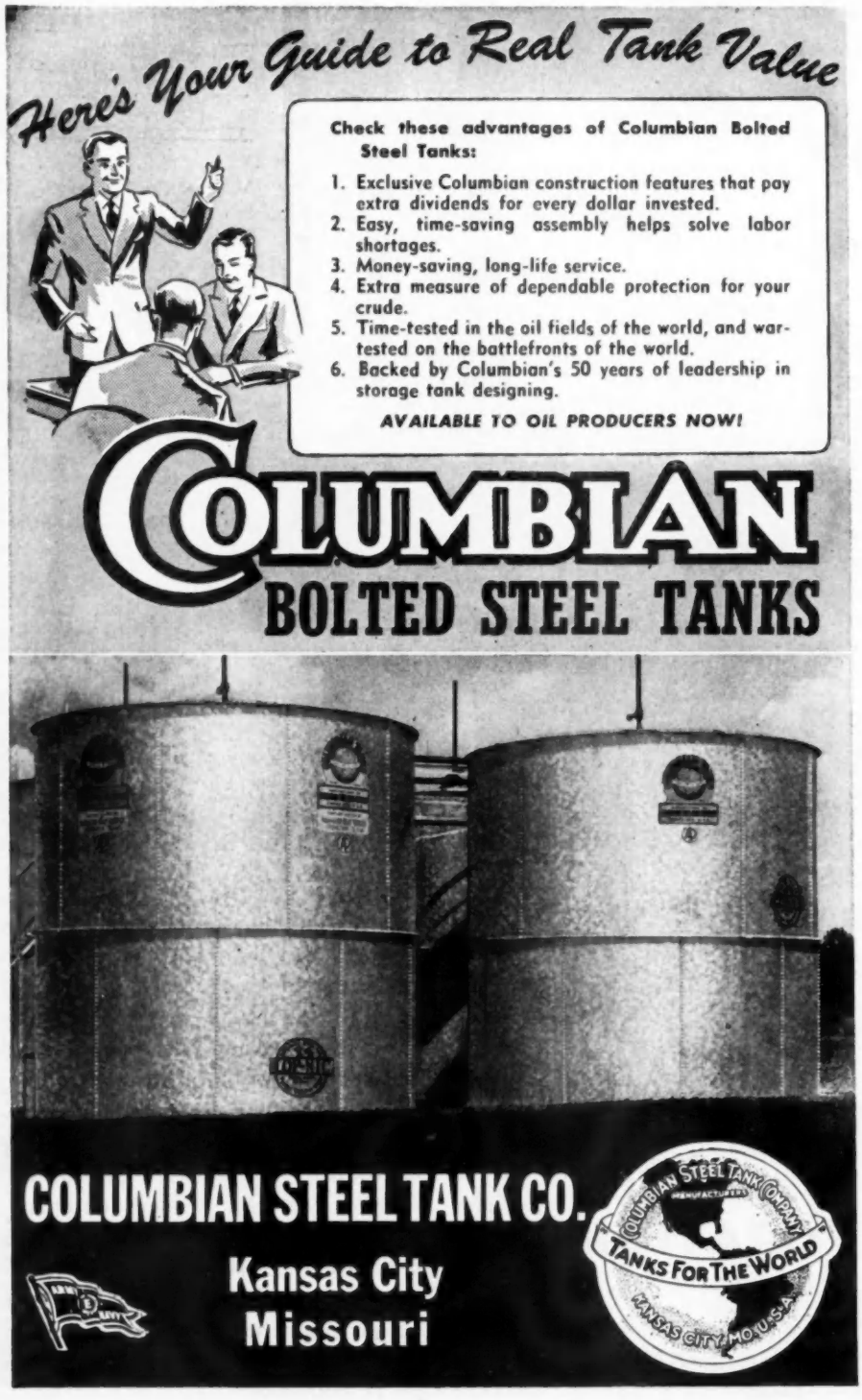
Sinclair-Wyoming Oil Company's Newman 2, Jefferson Davis County, is coring with no showings reported to just below 9946 feet, after picking top of the Massive Tuscaloosa at that depth.

Wayne County: Gulf Refining Company has completed 3 new oil wells in the Eucutta field, and T. F. Hodge has abandoned a wildcat northwest of the field. Gulf Refining Company's Stanley 8, Section 1-9n-9w, flowed 228 barrels daily through a ⅞-inch choke from perforations at 4970-5000 feet where it shot with 486 holes; Stanley 6 on the same lease was completed, pumping 280 barrels daily after perforating with 810 shots in the section from 4967-5212 feet; Stanley 7 is pumping 171 barrels daily from a perforated section between 4918 and 5040 feet.

T. F. Hodge's Masonite 1, was abandoned at 6571 fete, after failure to find other showings than that between 5157 and 5173 feet where a drill-stem test showed 40 feet of oil-cut mud and some drilling mud.

JERRY S. CURTIS, scout for Magnolia Petroleum Company at Oklahoma City, has been transferred to Roswell to cover New Mexico's activities.

C. O. FAULK, West Texas lease man for Magnolia Petroleum Company, has resigned to become district land man for the American Republics Corporation at San Antonio.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Alabama

Two More Choctaw County Oil Strikes in Prospect

H. L. Hunt, who opened the Gilbertown field in Choctaw County, first oil field in Alabama, is reported to have opened another producing area and recovered oil on a drill-stem test in yet another, both in Choctaw County. His W. S. Scruggs 1, Section 32-11n-4w, 2½ miles northwest of production in the Gilbertown field, was drilling below 3775 feet at latest report, and is said to have recovered 600 feet of clean oil on a drill-stem test in the Eutaw zone, depth of pay not reported. Production in the Gilbertown field is from Selma.

H. L. Hunt's Robert Land 2, another wildcat 2 miles west of the Scruggs well and nearly 6 miles from the Gilbertown field, is swabbing oil at the rate of 20 barrels hourly from the Ripley sand of the Selma series. Production is from the 2800-foot level, the hole having been plugged back from 5400 feet. Salt water was recovered on a test in the Eutaw at 3670 feet.

Stanolind Oil & Gas Company's Jack Woods A-1, Lamar County, is underreaming the 10-inch casing preparatory to shutting off gas which is showing from sand at 2275-2420 feet. At this point it is estimated good for 6,000,000 cubic feet of gas daily. Earlier this well had shown gas estimated at 750,000 cubic feet daily from sand at 325 feet.

Georgia

Stanolind Oil & Gas Company's Pullen 1, wildcat in Lot 133, Land District 10, Mitchell County, Georgia, has reached granite wash at 7308 feet and is drilling below 7328 feet. No showings have been reported in this well.

H. L. Hunt is preparing to spud in Metcalf 1, C NE, Lot 260, Land District 21, Decatur County wildcat.

Florida

Pure Oil Company Will Drill Test in Gulf County

The Pure Oil Company is building roads and preparing to move in materials to C. C. Hopkins 1, Section 21-6s-9e, Gulf County.

Collier County: Humble Oil & Refining Company's Gulf Coast Realties 2, wildcat in the Sunniland area, is drilling at 12,808 feet, still in anhydrite.

Dade County: Humble Oil & Refining Company's State 1, Section 30-55s-36e, is repairing motors before drilling ahead. It was delayed at 3810 feet for some time with a fishing job, but is now ready to go ahead.

Michigan

Deep River Production Extended Further Southeast

Holloway and American Drilling Companys' Kocot 1, NE NW NW 16-19-n-4e, Deep River field, Arenac County, flowed up to 55 barrels per hour natural from Dundee lime at 2775-84 feet to extend the field another half mile southeast.

Mecosta County: W. C. Taggart's Fee 1, W½ SE SW 11-15n-10w, Big Rapids Township, gauged 2,000,000 feet of gas in Stray sand at 1093-1116 feet and showed water at 1118-20 feet. Casing will be set through Marshall beds, approximately 1250 feet and hole carried to Dundee-Monroe to test for oil. Production test on Stray appears to assure a new gas reserve of considerable importance. The outpost is located inside the city limits of Big Rapids and is three blocks from the downtown district.

Bay County: Gulf Refining Company set 5½-inch casing at 7951 feet on Salina 1, S½ SE SE 34-15n-4e, deep Salina gas test, but may not have secured an effective cement job. Cement, 550 sacks, flash set during the operation, to baffle both cementing and company engineers. Influence of pressure and salt water was believed cause of the trouble. Casing was set in preparation of further production tests for gas and distillate in the Salina section between 7200 and 7883 feet, total depth. Drill-stem tests, however, showed little encouragement.

Rocky Mountain Area

Lance Creek Well Has Oil in Morrison Sand

The Morrison sand in Ohio Oil Company's Converse Sheep 9, NW SW SE 32-36n-65w, in the Lance Creek field, Niobrara County, Wyoming, tested at the rate of 35 barrels of 40-gravity oil per hour on a 50-minute drill-stem test at 3400-3435 feet. Present production in the field is obtained from basal Sundance sand and Leo sands of the Minnelusa formation, and while showings of oil have previously been reported in the Morrison, the showings were never tested. Inasmuch as the well is on the top of the structure, the productive area of the Morrison is believed limited.

Continental Oil Company has abandoned Christiana 1, NE SE NW 32-37n-92w, Barren Butte structure, in Fremont County, Wyoming, in Pierre shale at 4878 feet, having found only a few showings of dead oil. Base of the Wasatch was logged at 2300 feet and top of the Mesaverde at 3300 feet.

Two Bar: Pacific Western Oil Company's Government 1, SW NE SW 24-31n-81w, on the Two Bar structure in Natrona County, Wyoming, was a failure at 4047 feet. Top of the Madison was reached at 3794 feet.

Poison Creek: Stanolind Oil & Gas Company's test of its Poison Creek block, State 1, NE NE SW 16-37n-93w, Fremont County, Wyoming, has been abandoned at 4182 feet. Base of the Wasatch was reached at 3786 feet.

Spring Creek: The Spring Creek structure in Fremont County, Wyoming, will be tested to the Tensleep by Phillips Petroleum Corporation's Hintze 1, SE NW NW 7-28n-92w, which spudded July 29.

Cooper Cove: Stanolind Oil & Gas Company tested water in the Dakota sand in its second test of Cooper Cove Carbon County, Wyoming, Dakota sand discovery of a few months ago. U.P. 1, NE SE NE 19-18n-77w, drilled into the Dakota at 4913 feet and drill-stem tests of the sand showed several hundred feet of water. Hole was plugged back to 3950 feet from 5000 feet and after setting whipstock is redrilling at 3954 feet. The discovery well of the field in SE NE SW 20-18n-77w, was drilled 163 feet into the Sundance to 5373 feet before plugging back for completion in Dakota at 4834-4912 feet. The Sundance was water bearing.

Bell Rock: Stanolind Oil & Gas Company's Hanawalt 1, NE SE SE 4-6n-92w, Sundance test of the Bell Rock structure in Moffat County, found the top of the Dakota at 8233 feet and is coring in hard dry sand at 8257 feet.

WESTERN CANADA

New Company Starts Three-Well Program

Wesreserve Oil Company, Ltd., a new company, has staked the first well in a projected three-well program on the Millburn Creek structure, a few miles southwest of Calgary, Wesreserve No. 1, lsd 7 36-23-4w5th, slightly east of the indicated crest. Depth to the Madison lime objective is estimated at 6400 to 6800 feet.

Millburn Creek structure lies along a fold, flanking the Turner Valley field to the east (where it is known as Calling Valley) and extending northwest through the Millburn Creek area to the Jumping Pound area. In the latter area, the fold is now being tested by Shell Oil Company's No. 4-24-J. This well, currently drilling below 5200 feet, expected the Madison lime around 10,000 feet.

Gaspe Test Approaching Expected Oil Sandstone

Continental Petroleums Limited's No. 2 well on Gaspe Peninsula, eastern Canada, 17 miles west of Gaspe village, is drilling and coring below 2064 feet, with 8⅝-inch casing cemented at 1417 feet, and is approaching sandstone which is believed by the operators to have possibilities of oil production.

The last 200 feet have been in very hard and non-porous shale, although at 1920-1958 feet and again at 2036 feet, with indications of porosity, oil was encountered and several barrels of oil were bailed out of the hole. These zones are to be tested for production at a future date.

P. F. SHANNON has been elected president of Royalite Oil Company, Ltd., West Calgary, Canada, to succeed the late J. H. McLeod.

Shannon has had experience in the oil business dating from before World War I when he was employed with Indian Refining Company. After the war he went with Continental Oil Company as engineer and later field superintendent in Wyoming and Montana. In 1924, he became associate professor in the Department of Petroleum Engineering at the Colorado School of Mines. In 1928 he went to Colombia as field superintendent for Tropical Oil Company at Barrance Bermeja, where he became manager of that company's producing operations in 1933, which position he held until his recent appointment as head of Royalite Oil Company.

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U. S. Exploratory Completions

CALIFORNIA WILDCATS

Colusa County—Failure: Union Oil Co.-General Petroleum Corp.'s Capital 2, nw nw sw 27-16-1, Colusa area, abnd 2600 ft.

Imperial County—Failure: Pure's Truckhaven Unit 1, ne ne ne 26-10-9, Truckhaven area, form. abnd 6100 ft.

Kern County—Failures: Richfield's Olig 1, sw ne ne 12-30-21, McKittrick area, abnd 2300 ft.

Richfield Oil Corp.'s Olig 2, nw se ne 12-30-21, McKittrick area, abnd 1473 ft.

U. S. Drilling Co.'s Russell 1, se sw ne 26-28-29, Round Mountain area, abnd 1550 ft.

Macco Construction Co.'s Equitable 1A, nw ne se 4-32-23, Midway 33B sand area, abnd 4504 ft.

Tide Water Associated's Community 23, ne sw nw 18-30-29, abnd 4433 ft.

Kings County—Failure: Standard's Von Glahn 1, c se 34-23-22, Alpaugh area, abnd 4593 ft.

Orange County: Providence Oil Co.'s Chapman 1, nw ne nw 36-3-10, Placentia area, abnd 5000 ft.

Sacramento County—Failure: Amerada's N. Anderson 2, Rio Vista area, abnd 6218 ft.

Tehama County—Failure: Richfield's Gallatin 1A, ne sw se 26-25-3, Corning area, abnd 4110 ft.

Tulare County—Failure: L. B. Tannehill's 1, sw sw ne 22-23-27, Terra Bella area. Marine beds 1304-1457 ft, slate 1636 ft, abnd 1688 ft.

ILLINOIS WILDCATS

Clay County—Oil Discovery: Pure's Smith 1, sw se se 35-3n-8e, pump 285 bbls, McCl 2968-76 ft, td 3002 ft.

Clay County—Failure: Krohn's Smith 1, se se se 10-4n-5e, abnd 2706 ft.

Edwards County—Oil Discovery: Nash et al's Jones 1, se nw ne 31-1n-10e, pump 132 bbls, O'Hara 3236-46 ft, td 3253 ft.

Fayette County—Failure: Hammer's Diepert 1, se ne nw 23-5n-4e, abnd 2570 ft.

Franklin County—Failure: Sohio's Webb 1, se sw se 17-5s-4e, abnd 3252 ft.

Montgomery County—Failure: Northern Ordnance's Bohan 1, nw se 18-8n-4w, abnd 725 ft.

Montgomery County—Failure: Northern Ordnance's Pendarvis 1, nw nw 17-9n-4w, abnd 446 ft.

Perry County—Failure: Sohio's Schonski 1, ne ne sw 50-4n-2w, abnd 1444 ft.

Richland County—Failure: Pure's McBride 1, sw se se 16-3n-9e, abnd 3060 ft.

Wabash County—Failure: Fox et al's Woodyard Est 1, ne se se 33-2s-13w, abnd 2794 ft.

Wayne County—Failure: Gulf's Meyers 1, nw sw sw 25-1s-5e, abnd 3175 ft.

Wayne County—Failure: Lambert's Faberty 1, ne sw ne 2-1n-6e, abnd 3311 ft.

Wayne County—Oil Discovery: Rehfield's Ansbury 1, ne ne se 9-1n-9e, pump 210 bbls, McCl 3236-40 ft, td 3247 ft.

INDIANA WILDCATS

Dubois County—Failure: Kigo Drlg. Co.'s Kemper 1, sw ne 9-3s-6w, abnd 1377 ft.

Pike County—Failure: Robinson's Roush 1, se nw sw 17-2s-8w, abnd 1675 ft.

Posey County—Failure: Redgrave's Graulich 1, se se ne 9-7s-13w, abnd 2808 ft.

KANSAS WILDCATS

Barton County—Oil Discovery: Phillips' Chal 1, se se nw 25-16s-14w, Arb 3401 ft acid 2500 gals 3401-41 ft, pump 145 bbls, 38-gravity, td 3441 ft.

Dickinson County—Failure: Phillips' Lillian 1, sec 28-12s-1e, Vi 3069 ft Simp 3192 ft, Arb 3276 ft, abnd 3310 ft.

McPherson County—Oil Discovery: Derby's Day 1, nec 1-19s-2w, Miss 2984 ft, pump 100 bbls, 2984-3006 ft, td 3006 ft.

Morris County—Failure: Dr. Franks' Nelson 1, cse sw 6-15s-7e, granite 2967 ft, abnd 2988 ft.

Morris County—Failure: Deiter et al's Porter 1, ne ne sw 24-16s-9e, abnd 2382 ft.

Norton County—Failure: Phillips' Myra 1, nec nw 36-3s-23w, Lans 3454 ft, granite 3705 ft abnd 3732 ft.

Reno County—Failure: Adair & Morton's Koch 1, sec 18-25s-4w, Miss 3518 ft, Vi 3984 ft, Simp 4010 ft, Arb 4090 ft, abnd 4142 ft.

Saline County—Failure: Anderson-Prichard's Currie 1, ne nw se 12-15s-1w, Lans 1995 ft Miss 2636 ft, abnd 2655 ft.

Sedgwick County — Failure: Atlantic's Friends Univ 1, sw se 6-25s-2w, Simp 3943 ft Arb 4047 ft, abnd 4130 ft.

Sedgwick County—Failure: Beech Aircraft's Shinn 1, sw sw ne 15-28s-2e, Simp 3332 ft, Arb 3388 ft, abnd 3426 ft.

Stafford County—Failure: Huber's Ward 1, ne nw ne 36-25s-12w, Simp 4175 ft, Arb 4254 ft, abnd 4304 ft.

KENTUCKY WILDCATS

Webster County—Failure: Thompson et al's Martin 1, 25-M-20, abnd 2375 ft.

Webster County—Failure: Maires et al's Goodloe 1, 21-M-27, abnd 2615 ft.

SOUTH LOISIANAN OUTPOST

Evangeline Parish—Pine Prairie Field: Gulf's Schlicher-Thomas A-8, ne/4 of 3-4s-1w, South flank of dome, td 10,669 ft, perf 9272-80 ft and 9286-93 ft, 110 bbls, 3/16-in, grav 39.6, tp 225 lbs, Sparta sand.

SOUTH LOUISIANA NEW PAY

Iberia Parish—Avery Island Dome: Humble's Petit Anse B-1; 23-13s-5e, perf 10,162-175 ft, 369 bbls 42.2-gr oil, 10/64-in, td 10,546 ft.

MICHIGAN WILDCATS

Clare County—Failure: Freeman Oil Co.'s Gleason 1, ne nw ne 35-17n-4w, Dundee lime 3712 ft, abnd 3831 ft.

Ionia County—Failure: H. J. Schrauben's Patrick 1, sw sw ne 4-4n-6w, abnd 2410 ft.

MISSISSIPPI WILDCATS

Jasper County—Failure: Kingwood Oil Co.'s Campbell Est. 1, nec sw nw 2-10n-10w, abnd 5272 ft.

Wayne County—Failure: T. F. Hodge's Masonite Corp. 1, c sw se 23-10n-9w, elev 326 ft, Wilcox 1200 ft, Eutaw 5105 ft, Massive 6755 ft, abnd L. Cret 6996 ft.

NEW MEXICO WILDCATS

Lea County—Gas Discovery: DeKalb Agricultural Assn's Stovall-Magnolia 1, c ne sw 8-20s-38e, 4½ mi e Monument field, elev 3576 ft, anhydrite 1510 ft, base salt 2600 ft, broken Yates gas pay 3050-3200 ft, 2,000,000 ft gas open cas, used 500 gals mud acid Yates perf 3150-3200 ft, td 7955 ft, pb to 4055 ft.

OKLAHOMA WILDCATS

Creek County—Failure: Sinclair Prairie's Watson 1, nw se ne 16-14n-8e, Osw 2270 ft Prue 2286 ft, Skinner 2456 ft, abnd 2510 ft.

Hughes County—Gas Discovery: Stanolind et al's Clark 1-A, ce½ nw 21-5n-11e, perf 144/5490-5526 ft, perf 32/5536-5540 ft, 11,800,000 gas, td 5558 ft.

Kay County—Failure: Pure's Phelps 1, se sw nw 19-26n-1e, Arb 4238 ft, abnd 4410 ft.

Okfuskee County—Failure: Wilcox O&G Co.'s Fulsom 1-A, nw nw nw 15-12n-10e, Wx 3625 ft, abnd 4743 ft.

Oklahoma County — Extension: Phillips' Coder 1, se ne 9-14n-4w, flow 1285 bbls 41-gravity oil, td 6718 ft.

Osage County—Failure: Norbla Drlg. Co.'s Osage 1, sw sw sw 15-25n-7e, Osw 2364 ft, Miss 2675 ft, abnd 2700 ft.

Stephens County—Failure: Pace et al's Suckky 1, sw sw nw 26-2s-7w, abnd 1910 ft.

EAST TEXAS WILDCATS

Smith County—South Tyler Field Discovery: Phillips' McMinn 1, 180-ac tr, Mary M. Long Sur, 6 mi s by w Tyler and 10½ mi w by s Chapel Hill field, nearest prod, elev 478 ft, Queen City 97 ft, Wilcox 670 ft, Pecan 3615-4102 ft, Austin 4677 ft, Sub-Clarksville 4950 ft, Woodbine 5152 ft, Georgetown 6042 ft, Paluxy 7428 ft, Glen Rose 8537 ft, light porosity 8610-15 ft, top massive anhydrite 9183 ft, Rodessa 9400 ft, porosity (fair) 9556-76 and 9613-27 ft, good porosity 9869-9932 ft, fair porosity 9941-61 ft, flowed 281 bbls 45.8-gr, gas-oil ratio 6040/1, natural on 10/64-in, tub press 4640 lbs, Rodessa perf 9918-29 ft, td 10,017 ft.

EAST TEXAS WILDCAT DEEPENED

Fannin County—Failure: Damon Oil Co.'s Chaffin 1, 1000 ft snl and 1008 ft wel 108-ac tr, J. Ketchum sur, elev 568 ft, owdd, otd 1516 ft, Georgetown 1254 ft, Goodland 1730 ft, Paluxy 1770 ft, 1st Glen Rose 2125 ft, Paleozoics 3115 ft, abnd 3120 ft.

WEST CENTRAL TEXAS WILDCATS

Callahan County—Failure: Harry Hines et al's Knuckles 1, 2200 ft snl and 330 ft ewl T&P 65, blk 14, elev 1761 ft, abnd 1927 ft.

Jones County—Failures: Bell Oil's Beaty-Akin 1, 330 ft nsl and 440 ft wel sec 44, Deaf & Dumb Asylum Lands, elev 1618 ft, abnd 3560 ft.

Lyons & Prentiss' Richardson 1, 2250 ft snl and 2800 ft ewl of Ambrose Crain sur 214, elev 1851 ft, abnd 3512 ft.

J. D. Andrews et al's Swann 1-B, 5102 ft snl and 330 ft wel I. Miley sur 281, elev 1838 ft, abnd 3260 ft.

Panhandle Ref. Co.'s Baker 1, 1800 ft nsl and 330 ft ewl labor 6, league 125, DeWitt CSL sur, elev 1808 ft, junked 1970 ft.

Great Lakes Carbon Corp.'s Ramsey 1, 1650 ft nsl and 330 ft wel T&P 79, blk 14, abnd 2205 ft.

Jones County—Oil Discovery: Merry Bros. & Perini-Alder Oil Co.'s Weaver 1, T&P 6, blk 17, 1¼ miles s of Freeman pool, elev 1726 ft, Saddle Creek 2295 ft, Flippen 2355 ft, Cook 2461 ft, pump 75 bbls 38-gr, shot 10 qts 2463-67 ft, td 2474 ft.

McCulloch County—Failure: D'Arcy M. Cashin et al's Smith 1, 660 ft out NEc 750-ac tr, L. Eckhardt 1293, abnd 2502 ft.

Shackelford County—Failure: C. D. Neff et

MARMON-HERRINGTON *All-Wheel-Drive*

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■ FOR SALE: One 13" OD Pipe Machine complete with Landis head and chasers; one 7" OD Pipe Machine complete with Landis head and chasers. Texas Iron Works, 1423 Maury Street, Houston, Texas. Phone C-0367, LD-418.

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TEXAS GULF COAST WILDCATS

Brazoria County—Failure: Pure's G. S. Johns 1, Jos. White Sur. 7 mi w of West Columbia, abnd; td 8730 ft first hole; 7863 ft sidetracked hole.

Colorado County—Failure: Cities Service's Everett 1, Ramsey area, 8 mi nw of Eagle Lake, A. Alley sur, abnd 9389 ft.

Wharton County—Failure: H. C. Cockburn's H. P. Stockton 1, show oil 7800 ft, abnd 7964 ft.

TEXAS GULF COAST EXTENSION

Wharton County, El Campo Extension: Seaboard's Rudolph Holub 1, ne sect 62, ½ mi se of prodn, DUAL COMP. perf 24/6820-40 ft, flow 157.17 bbls 38.9-gr oil; perf 7588-92 ft flow dry gas, no gauge, td 7715 ft.

TEXAS GULF COAST NEW PAY

Chambers County—Smith Point: Standard of Texas' State-Galveston Bay 3-109, td 9785 perf 9442-58 ft, flow 16,000,000 gas, open flow.

LOWER GULF COAST WILDCATS

DeWitt County—Cottonwood Creek Discovery: Arkansas Fuel Oil Co.'s W. F. Buehrig 1, 567 ft fr nwl & 755 ft fr nel Sur 234, perf 7626-35 ft, comp gas-condensate well, no gauge, td 7700 ft.

Bee County—Failure: Windsor's Clark Wood 1, Jas. McGeehan Sur, 10 mi w of Woodsboro, 1954.6 ft fr e & 1485.58 ft fr sl of 160-ac lse, abnd 5828 ft.

Jackson County—Failures: Butcher-Arthur's LaBauve et al 1, 10 mi sw of LaWard, 1980 ft e of e bank Swan Lake, Hugh McGuffin sur, abnd 7508 ft.

B. G. Von Roeder's Marcus Rosenwasser 1, 4 mi se of Cordele, T. H. P. Heard lge, 466.7 ft fr n & w lines 176.4-ac lse, abnd 5430 ft.

Live Oak County—Failures: Smith & Story's Kline 1, 6 mi n of Mathis, 330 ft fr nw & sw lines of 80-ac lse, Jno McMullen grt, abnd 3950 ft.

Argo Oil Corp.'s T. M. Brookshire 1, J. Pointevent sur 75, 375 ft fr nw & 990 ft fr

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sel of 40-ac unit, 4 mi s of Clegg, abnd 3905 ft.

Willacy County—Failure: Sun's Santa Rosa, Inc. 1, 8 mi se of Raymondville, 1485 ft fr nl & el of Sh 44, San Juan de Carricitos grt, abnd 11,520 ft.

SOUTHWEST TEXAS WILDCATS

Jim Hogg County—Failure: M. L. Massingill and W. E. Spice Jr.'s Allen & Hellen 1, H&GN 23, 12 mi sw of Hebbronville, 380 ft fr nl & 30 ft fr wl of sur, abnd 3184 ft.

Webb County—South Bruni Discovery: Chas. E. Fraser's Bruni 1, 330 ft fr nl & 1602 ft fr wl 320 ac lse, C&M 447; perf 10/1810-12 ft, flow 120 bbls, shut in 5 days, then flowed dry gas, tp & cp 400 lbs, shut in, td 1812 ft.

SOUTH CENTRAL TEXAS WILDCATS

Bastrop County—Failure: Marts & Bevan's Bryant 2, J. M. Bangs Sur, 6 mi nw of Bastrop, abnd 2365 ft.

Guadalupe County—Failure: H. R. Cullen's San Antonio Ld. & Tr. Co. 1, 467 ft fr s & e lines 160-ac tr Jno. A. Miller sur, 12 mi se of Seguin, abnd 4060 ft.

WEST TEXAS WILDCATS

Culberson County—Failure: O. C. Woods et al's Barfield 1, c se sw PSL 17, blk 82, abnd 575 ft.

Dickens County—Failure: Geo. P. Livermore, Inc.'s Bird 1, c nw ne H&GN 288, blk 1, elev 2551 ft, anhydrite 420 ft, salt 490 ft, Yates 1060 ft, lime 1540 ft, San Angelo 2493 ft, abnd 2602 ft.

Gaines County—Failure: Continental's Jones 1-A, se sw ne PSL 22, blk A-7, elev 3658 ft, anhydrite 2070 ft, Yates 3060 ft, San Andres 4560 ft, Clear Fork 5910 ft, Pennsylvania 9395 to 11,510 ft, Ellenburger 11,845 ft, abnd 12,222 ft.

Hockley County—Failure: Stanolind's DeLoach 1, 440 ft out NWc labor 19, leag 80, Reeves CSL, elev 3657 ft, anhydrite 2060 ft, brown lime 3360 ft, San Andres 3670 ft, Glorietta 5020 ft, abnd 6510 ft.

Irion County—Failure: Shell's Tankersley 1, 1660 ft snl and 1653 ft wel GC&SF Ry. 12, on 12,989-ac lse, elev 2333 ft, Ellenburger 7360 ft, Hickory (Cambrian) sand 8305 ft, abnd 8357 ft.

Pecos County—Failures: J. D. Atkins-J. S. Pittman's Shera-Standard 1, 3083 ft wel and 330 ft nsl T. C. Ry. 10, blk 110, elev 2453 ft, abnd 1681 ft.

Culbertson & Irwin, Inc.'s Barnes-Humble 1, c e¼ of e¼ H&GN Ry. 134, blk 10, elev 2371 ft, anhydrite 440 ft, Rustler 500 ft, Yates sand 910 ft, grains 940 ft, San Andres 1935 ft, Ellenburger 4385 ft, abnd 4452 ft.

Reagan County—Failure: Standard of Texas' University 1, lse No 28,358, elev 2712 ft, abnd 2938 ft.

WEST TEXAS OUTPOST

Andrews County—Means Extension: Sun's Gardner 1, c w½ nw ne PSL 17, blk A-35, 1¼ mi sw and 1¼ mi w by n nearest production, elev 3171 ft, top lime 4080 ft, San Andres 4511 ft, flow 232 bbls 31.5-gr, gas-oil ratio 486/1, 20/64-in, shot 340 qts 4431-4554 ft, Grayburg pay 4431-86 ft, td 4562 ft.

NORTH TEXAS WILDCATS

Archer County—Failures: Gulf's Prideaux 1-E, 467 ft out nec w-240 ac TE&L 1835, elev 1135 ft, Bend 4743 ft, Miss 5415 ft, Ellenburger 5601 ft, abnd 5924 ft.

D. H. Bolin et al's Harris 1, 1203 ft snl and 300 ft ewl blk 76, J. W. Harris sur, abnd 1353 ft.

D. H. Bolin et al's Harris 2, 1203 ft snl and 900 ft ewl blk 76, J. W. Harris subdiv, abnd 1355 ft.

Cooke County — Failures: Northern Ordnance's Adams 1, 330 ft wel and 380 ft snl of Joseph Burden sur, Ellenburger 2010 ft, abnd 2685 ft.

Tom L. Sessions et al's Hellman 1, 2150 ft snl and 330 ft ewl of Thos. Toby-G. Steele sur, abnd 2880 ft.

Denton County—Failure: Stanolind's Dunn-Parks 1, 660 ft from m/s/n and 660 ft ewl of 1552-ac tr and J. Parks sur, abnd 3416 ft.

Jack County—Failure: Brazos River Gas Co.'s Hartnett 1, 1980 ft ewl and 990 ft snl TE&L Co. 855, 2248-ac lse, Mississippi 5959 ft, abnd 5218 ft.

NORTH TEXAS WILDCAT DEEPENED

Young County—Failure: Hanlon & Buchanan's (was Thos. Humphrey) Barton 1, 660 ft snl and 675 ft wel W. T. Tankersley sur, elev 1202 ft, otd 4822 ft, Bend 4195 ft, Miss 4746 ft, abnd 5029 ft.

WESTERN CANADA WILDCATS

South Alberta Plains — Foremost: British American-McColl-Frontenac's Foremost 1, lsd 2 33-7-9w4th, abnd 3298 ft.

Taber: Major Oil Ltd.'s Major-Taber 2, lsd 4 9-9-17w4th, abnd 3369 ft.

☆

W. REESE DILLARD of Tulsa, formerly chief geologist for Norbla Oil Company, has resigned to open offices at Tulsa as a consulting geologist.

United States Wildcat Starts

ARKANSAS

Nevada County: Berry Asphalt Co.'s Mary Jackson Est. 5, 275 s&e of nwc nw ne 9-14-20, spud.

CALIFORNIA

Colusa County: Standard's Davis 1, ne ne sw 36-18-2, Princeton area, lcn.

Fresno County: Standard's Patterson 74, sw se ne 3-16-14, Tranquility area, lcn.

Kern County: U. S. Drilling Co.'s S.P. 3, nw se sw 23-28-28, Shark Tooth area, mim.

Kings County: Standard's Cutter 1, nw sw sw 29-32-22, Alpaugh area, rig.

Los Angeles County: British American-Texas Co.'s Newhall Land & Farming 1, Rancho San Francisco, Newhall, area; mim.

Ventura County: Union's Adams 41, se se se 19-4-21, Ex-Mission area, lcn.

FLORIDA

Collier County: Humble's Gulf Coast Realities 3, c sw se 28-48s-30e, lcn.

Gulf County: Pure's C. C. Hopkins 1, 21-6s-9e, lcn.

Highlands County: Humble's G. C. Carlton Est. 1, 34-38s-29e, dk.

Leon County: Stanolind's St. Joe Paper Co. 1, 15-2s-2e, lcn.

GEORGIA

Decatur County: H. L. Hunt's Metcalf 1, c ne¼ ld lot 260, ld dist 21, mim.

ILLINOIS

Bond County: Conray et al's Wildi 1, ne ne se 16-4n-2w, dr 442 ft.

Franklin County: Schlafly et al's Baldwin-Howe 1, ne se nw 32-5s-3e, lcn.

Ohio's U. S. Coal & Coke Co. 1-B, sw se nw 3-6s-4e, lcn.

Gallatin County: Heath et al's Farmer 1, sw ne se 18-7s-8e, lcn.

Jasper County: Gross' Donnelly 1, nw nw ne 24-5n-10e, lcn.

Jefferson County: Thompson's Stephens 1, se se ne 30-3s-4e, lcn.

Lawrence County: Big Four Oil et al's Perrott 1, ne ne se 27-2n-13w, lcn.

Marion County: Frontier Fuel's Lacy 1, ne nw nw 9-4n-4e, lcn.

Wayne County: Luttrell's Teterling 1, ne se nw 21-1s-9e, lcn.

White County: Sohio's Pearce 1, se nw se 3-7s-10e, dr 118 ft.

INDIANA

Dubois County: Texas Co.'s Bhehueesn 1, nw nw se 35-3s-5w, lcn.

KANSAS

Barber County: Phillips' Wheatley 1, nwc 10-34s-14w, lcn.

Butler County: Bennett et al's Whiteside 1, cw½ ne 20-25s-4e, rum.

Cowley County: Hall et al's Atkinson 1, 13-32s-5e, lcn.

Texas Co.'s Booton 1, nw sw sw 21-34s-3e, lcn.

Gove County: Texas Co.'s Fed. Farm Mortgage Co. 1, nw ne se 17-12s-30w, lcn.

Graham County: Phillips' Sandzen 1, sw sw se 14-9s-22w, lcn.

Meade County: Stanolind's Adams 1, swc 8-35s-30w, lcn.

Osage County: Anderson et al's Woodward 1, se sw sw 14-16s-16e, mim.

Pratt County: Texas Co.'s Frisbie 1, cnw se 7-26s-13w, lcn.

Barnsdall's Barnes 1, nec 18-28s-13w, woc.

Reno County: Texas Co.'s Miller 1, nw nw se 12-24s-10w, lcn.

KENTUCKY

Breckenridge County: Bullock et al's Thompson 1, 13-P-35, lcn.

Hopkins County: Bauder et al's Majors Est. 1, 5-L-25, lcn.

McLean County: Ohio's Thomas 1, 25-L-28, lcn.

Webster County: Ohio's Baker Est. 1, 3-M-23, lcn.

SOUTH LOUISIANA

Acadia Parish: Phillips' Onez 1, 1653.7 ft S 11 deg 31 min W of nec 16-10s-1e, lcn 9500-ft test.

Cameron Parish: Yegua Corp.'s Dobbertine 1, 1650 w & 990 n of sec 9-15s-14w, Johnson Bayou area, lcn 10,500-ft test.

Jefferson Davis Parish: Continental's King Corp. 1, 1650 n & 330 w of 30-7s-6e, Bayou Serpent area, lcn.

Terrebonne Parish: Louisiana Ld. & Exp. Co.'s LL&E Fee 1, 1972 s & 1782.7 e of USC&GS Sta "Crow" sec 8-20s-13e, lcn 10,000-ft test.

MISSISSIPPI

Claiborne County: Sun's W. R. Hammett 1, 3357 s 3731 w of e cor sect 15 but in 2-11n-1w, ru.

Lauderdale County: Providence Dr. Co.'s Flintkote 1, 660 fr nl 100 fr el sw 20-8n-18e, dr.

Stone County: Harry Morgan's Wilbie Lbr. Co. 1, c sf nw 1-3s-11w, mir.

OKLAHOMA

Bryan County: Hill's Sturat 1, ne se nw 15-5s-11e, lcn.

Comanche County: Texas Co.'s Conway 1-B, nw se nw 3-3n-10w, dr 1951 ft.

Creek County: Skelly's Dial 1, se ne se 36-14n-7e, rur.

Garvin County: Rocket Oil Co.'s Meeks 1, nw nw nw 32-1n-1w, lcn.

Sinclair Prairie's Allred 1, ne nw se 20-3n-3e lcn.

Delaney's Burke 1, nw nw ne 31-4n-3e, c&p.

Grady County: Olsen Drlg. Co.'s Pfile 1, sw ne ne 32-3n-7w, dr 1860 ft.

Logan County: Keryln Oil Co.'s Green 1, se nw 36-18n-4w, dr 2895 ft.

Noble County: Stanolind's Compton 1, sw sw se 6-24n-2w, rur.

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Edited by A. I. LEVORSEN

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Pawnee County: Lindsay et al's Orten 1, 33-22n-5e, dr 3018 ft.
Pottawatomie County: Cities Service's Harbour 1, ne ne nw 13-9n-2e, lcn.
Stephens County: Magnolia's Humphreys 1, ne sw sw 31-2s-4w, lcn.
Anderson-Prichard's Woods 1, sw sw ne 26-2s-7w, dr 1300 ft.

TEXAS GULF COAST

Colorado County: Quintana's Cullen 1, 2072 ft ne of Hwy. 71 & 660 ft sely at RA fr most nw'ly nwl of lse, Chas Fordtran Sur. lcn, 4000-ft test.
Jefferson County: Texas Co.'s Beaumont Farms 1, James Garrish Sur. 330 fr most w'ly n & e ls of 1046-ac tr & 2311 e of el of Maria Felipe Lazarine Sur. 2½ mi e of China. lcn 9000-ft test.
Wharton County: Salt Dome's T. P. Jones 1, S. P. Middleton Sur, 3 mi nw of Louise. 1320 fr wl & 1900 fr sl of 503.5 ac lse, lcn 6000-ft test.
Texas Co.'s C. D. Bergstrom et al 1, 6.3 mi nw Hillje, WCRR 37, 660 fr nl & 1980 fr el of Section. lcn 5000-ft test.

LOWER GULF COAST

Brooks County: Humble's D. Sullivan 1, 3000 fr el & 660 fr nl of Sur 152, 8 mi se of Falfurrias, lcn 10,000-ft test.
Goliad County: Guy E. Green et al's Parks 1, 10,714.51 ft fr sl & 4576.03 ft fr el of lse, Manuel de la Pena Sur 3 mi s of Fannin, ru 5000-ft test.
Jackson County: P. R. Rutherford and Royal O & G Co.'s Paul Skarpe 1, J. Heard lge 5 mi se Genado, 2850 e & 5300 nl of survey, lrn 7000-ft test.
Stewarts & Ralph Johnston's Frank Koop 1, R. Musquez Sur 660 se of nwl of lse & 530 s of Lavaca River, lcn 7500-ft test.
Jim Wells County: Smith & Mosser and H. B. Zachry's Embleton 1, 645.5 fr wl & 671.25 fr sl of Blk 16 & 40-ac lse, Los Presnos de Arriba grt lcn 6000-ft test.
Karnes County: H. R. Smith-W. C. McBride's McCaskill 1, Victor Blanco Sur 8 mi s of Runge, 1384 fr sw & 467 fr sel of 200-ac tr 9000-ft test, lcn.
M. H. Marr-Herman Brown's Tenberg 1-W, 467 fr se & sw ls Blk 2, 177-ac lse, Jas Johnson sur 164, lcn 7200-ft test.
Victoria County: Rowan & Hope's McCampbell 2, James McConnaughy Sur, 8 mi n of Inez, 2307 fr nw & 3000 fr sw lines of 1178-ac lse, lcn 4600 ft test.

SOUTHWEST TEXAS

Duval County: Hewitt & Dougherty's Duwell Company 1, J. Poitevent Sur 394, 660 fr swl & 1980 fr sel of lse & survey, dr 451 ft.

SOUTH CENTRAL TEXAS

Gonzales County: Quintana's Lamkin 1, 600 ft ne of sel Winslow Turner survey, lcn 9600-ft test.
Kerr County: Humble's W. E. Schreiner 1, BS&F 13, 660 fr ne & 1980 fr se lines of sur, nw cor of county, lcn.

MICHIGAN

Allegan County: Max Spidel's Balch 1, nw ne se 15-1n-15w, lcn.
Arenac County: Gordon Oil Co.'s Trombley 1, nw nw sw 9-18n-5e, rig.
Cass County: Lee & Ostrom's Ostrom 1, nw sw nw 22-8s-14w, lcn.
Lapeer County: Sinclair Wyoming Oil Co.'s McIntyre 1, sw sw sw 28-9n-9e, rig.
Mecosta County: W. C. Taggart's Fee 1, w½ se sw 11-15n-10w, dr.
Montcalm County: R. G. Smith's Paris 1, se nw nw 6-12n-8w, dr.

NEW MEXICO

Eddy County: Crabb & Couch's Cowan 1, 1980 ft wel and 4620 ft nsl 1-21s-28e, rig.
Lea County: Devonian Oil Co.'s State-Windfphr 1, c se ne 25-11s-35e, lcn 5300-ft San Andres test.
Sierra County: Wright and Winslow's State 1, se se sw 2-15s-3w, lcn.

EAST TEXAS

Cherokee County: Tom G. Shaw, tr's John H. Bolton 1, 427 ft nsl and 5683 ft ewl of Charles L. Widgeon sur and on 500-ac lse, 8½ mi se Jacksonville, lcn 4200-ft Woodbine test.
Hunt County: Paul B. Scott et al's Bertha Woodson 1, 900 ft snl and 330 ft wel of 100-ac tr, or 900 ft nsl and 8200 ft ewl Shelby CSL sur, 7 mi nw Quinlan, rur for 3300-ft Paluxy test.

WEST TEXAS

Culberson County: Robt. B. Richter et al's Geo. Daniel 1, 2079 ft nsl and 727 ft ewl T&P Ry. 12, blk 59, Tsp. 7, lcn 3500-ft test.
Dawson County: Richmond Dr. Co. et al's J. W. Nelson 1, c sw nw E. L. & RR. 34, blk M, lcn 5200-ft San Andres test.
Howard County: Ray A. Albaugh et al's W. H. Murray-Stanolind 1, c se ne T&P Ry. 29, blk 32, T-2-N, lcn 4000-ft cable tool test.
Mitchell County: Warren Pet. Co.'s Jones 1, 467 ft out SEc H&TC 9, blk 26, lcn 6500-ft Basal Clear Fork test.
Hickok P&D Co.-Harry Reynolds' T. L. McKinney 1, ne ne se T&P Ry. 30, blk 28, T-1-N, lcn 3500-ft cable tool test.
Pecos County: Humble's Kennedy 1-B, c

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Humble's O. W. Williams 1-C, 1650 ft from m/s/s and 330 ft from m/w/e lines GC&SF 19, blk 119, lcn 3000-ft test.

Yoakum County: Woodley Pet. Co.'s Ruth Googins 1, c nw sw sec 249, blk D, J. H. Gibson sur, lcn 5500-ft San Andres test.

WEST CENTRAL TEXAS

Hamilton County: C. I. Production Co.'s Lund 1, 330 ft out sec 773-ac tr, B. A. Carter Sur, SF 4223, A-2117, lcn 4500-ft cable tool test.

Jones County: Eltex, Ltd.'s T. A. Tucker 1, ne ne se T&P 13, blk 17, lcn 3000-ft cable test.

Panhandle Ref. Co.'s Baker 2, 330 ft wel and 760 ft nsl lab 5, leag 125, DeWitt CSL sur, lcn 3000-ft test.

Mills County: Northern Ordnance's C. M. Bramblett 1, 330 ft out NEc sw HT&B 31, lcn 3000-ft test.

Taylor County: Eltex, Ltd.'s W. M. Hayes 1, 330 ft out nwc lab 16, leag 124, Grimes CSL sur, sp 2800-ft cable test.

Stephens County: Texas Co.'s J. W. Parks 47-A, 330 ft out nwc TE&L sec 3373, lcn 5500-ft Ellenburger test.

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About Time

"I'm sorry, but it would be wrong for me to hide the truth from you any longer. You are a very sick man. Yes, very sick. Is there anyone you would like to see?"

"Y-e-s."

"Who?"

"Another doctor."

Far Worse

I don't know anything worse than letting the wife find a letter you've forgotten to mail.

Oh, I do.

What is it?

Letting her find one you forgot to burn.

Dark Moment

Downed pilot (on a Pacific isle): "Why do you look at me so intently?"

Cannibal: "I am the food inspector."

Way Back When

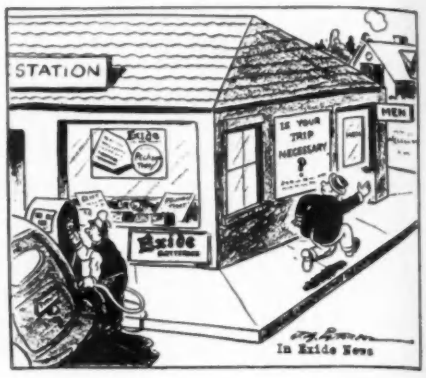
Who can remember when women could use whole pansfull of gasoline to clean gloves—and have enough left over to blow up their kitchens?—Jobber Topics.

An Oldie in a New Dress

A couple of M.P.'s heard a terrific noise in a pub, and on rushing in found a group of Allied soldiers tangled in a brawl. The M.P.'s untangled the group into three or four British Tommies, two Scotsmen and a couple of Americans.

Everybody but the larger of the two Scotsmen had calmed down and the M.P.'s asked a little Tommy what was the cause of all the row.

"We was orl friendly an' 'avin' dinner together as nice as you please," said the Tommy. "Good food, good ale—everything top 'ole. Then, when we all gets



kind of full like, the big Scotty here calls for the check."

At this the big Scot began to splutter and started to break away from the M.P.'s, who grabbed him tighter and asked how come.

"Dinna they tell ya," he blurted out as he again lunged for one of the American soldiers, "that this domn Yank is a ventriloquist?"

Beans

A teacher called for sentences using the word "beans".

"My father grows beans," said the bright boy of the class.

"My mother cooks beans," said another pupil.

Then a third popped up: "We are all human beans."

Ungrammatical Tramp

Did you notice the pile of wood in the yard?

Yes, lady, I seen it.

You should mind your grammer, and say you saw it.

Lady, you saw me see it, but you ain't seen me saw it.

Counter Threat

Just suppose we wives should go out on strike?

Go right ahead. I've got a peach of a strikebreaker in mind.

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Form 280—Daily Drilling Report—33 triplicate sets to book, size 5½ x 8½

Form 282—Three Tour Drilling Report with Pipe Tally, size 8½ x 11—33 triplicate drilling sets, 10 duplicate pipe Tally sets to book

Form 290—Pipe Line Run Tickets—33 triplicate sets to book, size 4½ x 7½

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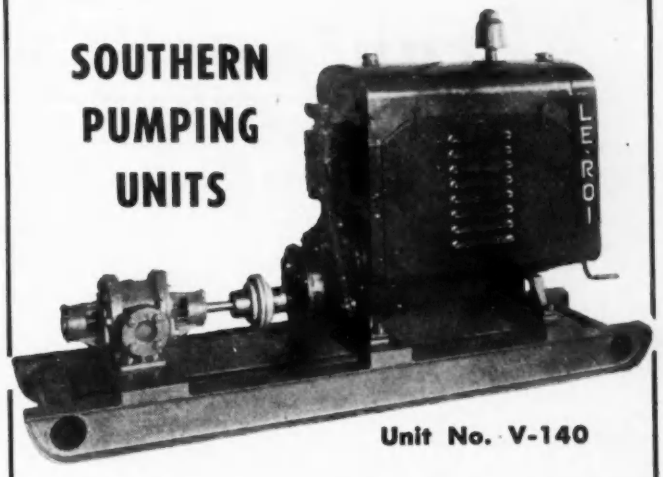
INVERSE OILER WITH MARVEL MYSTERY OIL

SOUTHERN PUMPING UNITS



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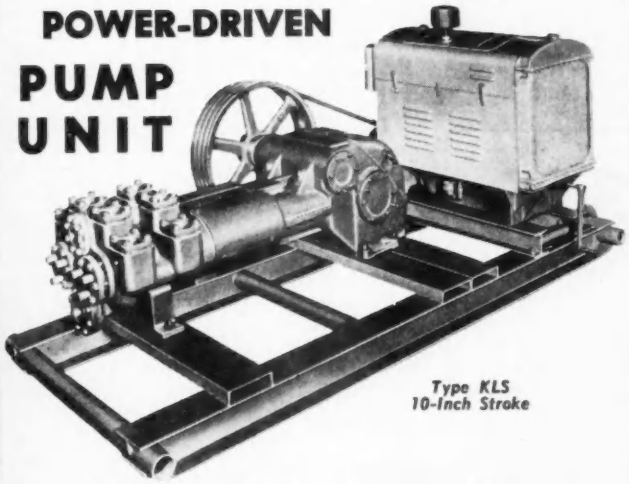
LOCKETT-WORTHINGTON POWER-DRIVEN PUMP UNIT



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10-Inch Stroke

WORTHINGTON Pumps and *genuine* Worthington Repair Parts are available — through Lockett Dealers — from Warehouses maintained in the principal oil fields throughout Texas and Louisiana, backed up by a large replenishing stock at our Houston and New Orleans Warehouses. This enables Lockett Dealers to promptly supply needed equipment. Worthington Pumps are adaptable for use with Engines or Motors of any specified type or manufacture, to provide a complete pumping unit.

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Notes for the Equipment Buyer and User

Hazlett Advanced to Head Of Sales for Jones & Laughlin

Jones & Laughlin Steel Corporation announces the following changes in its organization, effective July 27, 1944:

Lewis M. Parsons has resigned as a director and a member of the executive committee, and as vice president in charge of sales, of the corporation.

Adam J. Hazlett, general manager of sales, has been elected vice president in charge of sales of the corporation.

John W. Reavis, a member of the law firm of Jones, Day, Cockley and Reavis, of Cleveland, has been elected a director of the corporation.

International Harvester Makes Changes at Dallas and Tulsa

The Industrial Power Division of the International Harvester Company, Chicago, announces the following changes in personnel:

H. R. Carlson has been appointed manager of the branch office at Dallas. He will work with the company's representatives in parts of Alabama, Louisiana, Mississippi, and Texas.

Carlson has been with the company 25 years and has been identified with the industrial power sales department for the last 14 years. Traveling throughout the South and Southwest he has had his headquarters in Dallas. For the past 7 years, in addition to working with the construction industry, he has devoted considerable time to the various oil fields in this territory.

R. H. White has been made manager of the Tulsa office, and will cover parts of Oklahoma, Kansas, Missouri, and Arkansas.

White has been with the company branches at Oklahoma City and Tulsa since he joined the company in 1935. He has a wide acquaintance in both the construction industry and the oil industry.

H. R. Carlson

R. H. White

Louisiana Supply Company Announces Personnel Changes

Louisiana Supply Company, Sulphur, Louisiana, has elected James F. Garst vice president in charge of sales, succeeding F. A. Tieman who resigned July 1. Herman M. Busch was also promoted to treasurer, succeeding A. J. Sheppard, Jr., who resigned July 20. Garst was formerly with Black Sivalls & Bryson at Lafayette, Louisiana. He became associated with Louisiana Supply Company in March. Busch has been secretary of the company since 1934.

☆

FRANK WHEATLEY, Jr., vice-president and general manager of Frank Wheatley Pump & Valve Mfgr., Tulsa, is now in the U. S. Army Air Corps, stationed at Sheppard Field, Texas.

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Compressor Control Device

MANNING, MAXWELL & MOORE

The Electro-Mechanical Division of Manning, Maxwell & Moore, Bridgeport, Connecticut, announces the Ashcroft Compressor-Trol. The manufacturer states that this new instrument combines seven devices for the control of compressor operations into a single, compact unit, eliminating the necessity of using pipe and pipe fitting, and simplifying installation procedure and reducing the possibility of air leakage.

The unit is made in three sizes, ½, ¾ and 1¼ inches, determined by inlet connection, and covering all requirements of tank-mounted compressors up to 15 horsepower, or 60 cubic feet per minute. The outfit is equipped with a switch, with either an electric or mechanical attachment for operating the two-way unloading valve mounted on the Compressor-Trol casting.

The muffler on the compressor discharges into the tank. The muffler also acts to break up the discharge and to disperse the air in a manner which insures adequate mixing with the cooler gases in the tank to reduce the temperature and moisture content before delivery.

The combined switch and gauge has a heavy-duty gearless movement, slide-rule dial, a horizontal self-draining and non-freezing Bourdon tube, and the entire gauge is removable and replaceable in case of accidental damage. It can be furnished in all standard pressure ranges.

Houston Oil Field Material Will Build New Plant

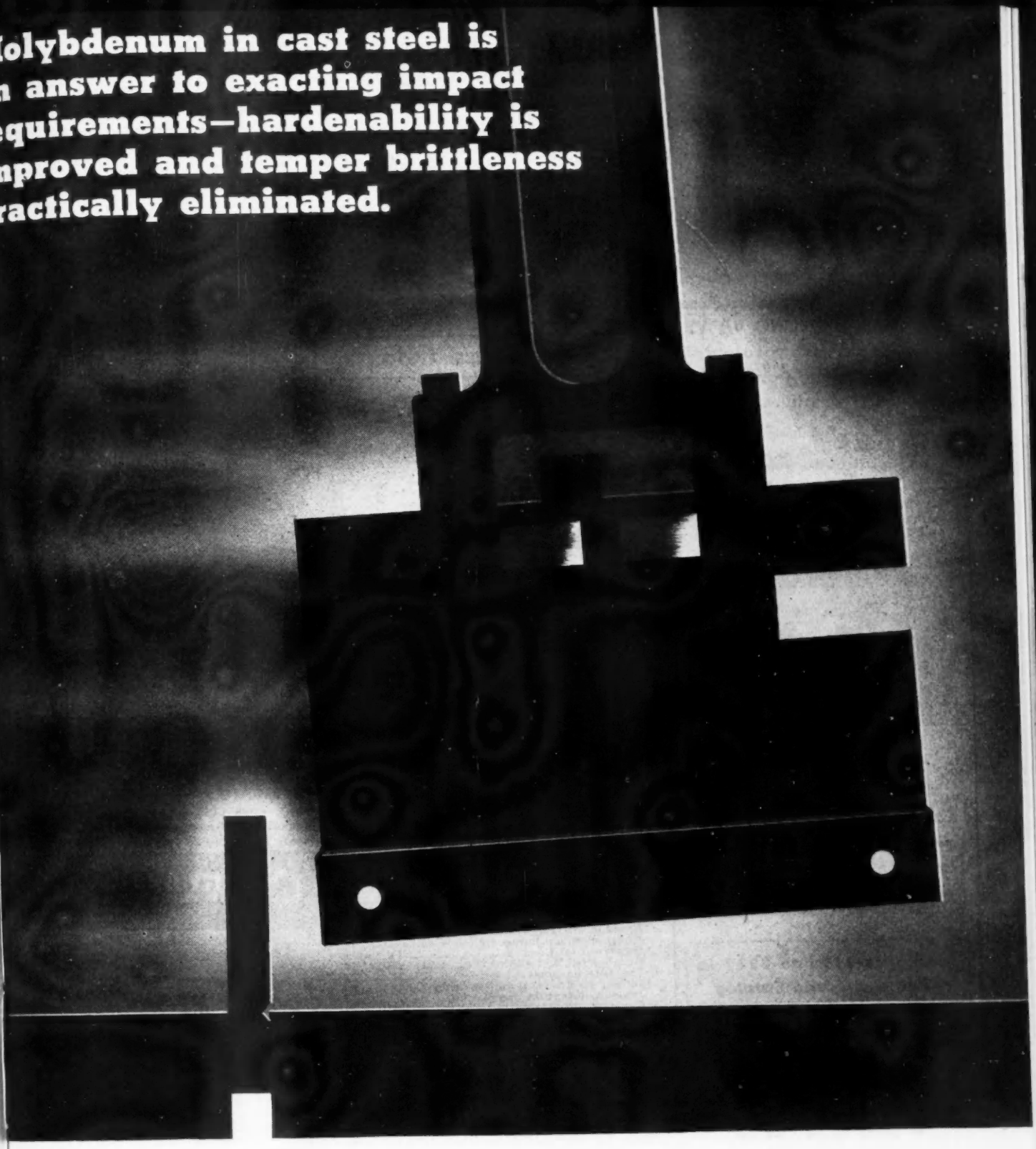
Houston Oil Field Material Company has announced construction of the first unit of a $1,000,000 industrial plant and office building project, to be located on Wayside Drive and McKinney Avenue, Houston.

The first unit, a chemical building will be 100 x 150 feet. Subsequent units will consist of a shop building 200 x 200 feet with office space comprising a wing 22 x 83 feet, a garage 100 x 100 feet, a warehouse and display building 100 x 260 feet and a three-story office building approximately 100 x 100 feet.

Sucker Rods

The S. M. Jones Company, Tulsa, Oklahoma, has published the fifth edition of a booklet, "Care and Handling of Sucker Rods," in the interest of better care and handling of sucker rods. The following subjects are discussed in detail with interesting illustrations: Unloading and storing rods; loading and hauling rods to the well; rod crew equipment; running new rods; pulling and servicing rods; laying down rods; sucker rod reports and records; well studies; pumping of wells; endurance limits; tapered sucker rod strings; and dimensions and weights. The booklet carries many changes and additions over previous editions.

Molybdenum in cast steel is an answer to exacting impact requirements—hardenability is improved and temper brittleness practically eliminated.



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Only 2½ to 5 turns are required to fully open or close the ORBIT DRILLING VALVE. The seats are protected against damage from drilling tools and wire lines.

Orbit Flanged End Drilling Valve

Orbit Drilling Valves are available in both full opening and nominal opening sizes. With flanged or screwed ends.

See Pages 2194 to 2211 in 1944 Composite Catalog

ORBIT VALVES

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Bethlehem Steel Company Buys American Well & Prospecting

Bethlehem Steel Company has purchased American Well & Prospecting Company, Corsicana, Texas. General offices of the company will be at 805 East Archer Street, Tulsa. The executive organization will be as follows: G. A. Tompson, vice president; R. G. Ayers, general manager of sales; A. W. Tarkington, assistant treasurer, and R. G. Petri, auditor and assistant secretary.

The plant and office at Corsicana will be under the management of J. E. Rittersbacher, former president of American Well & Prospecting Company. Founded in Corsicana nearly half a century ago, the company grew to be one of the leading manufacturers of rotary oil well drilling machinery, having originated the rotary method of drilling.

Bethlehem Steel Company has plans to enlarge the plant and expand its operations. Products will be marketed through Bethlehem Supply Company, a subsidiary of Bethlehem Steel Company.

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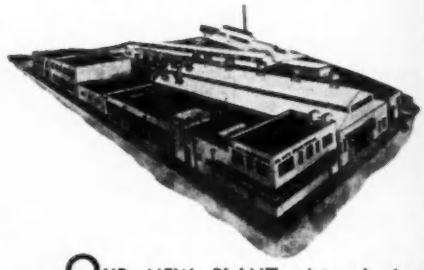
C. R. CLARK has joined Lake Oil Company as geologist and landman at Ada, Oklahoma.

B. R. McHENRY, director of the department of industrial and adult education of the Tulsa Public School System, has joined the Gulf Oil Corporation at Tulsa as special assistant to S. G. Sanderson, general superintendent of production.



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